ELECTRICAL Y SECTIONS SPECIFICATION

FOR

CITY COLLEGE PLYMOUTH
MARINE TECHNOLOGY CENTRE

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Project Revision Sheet

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Preface

The projects electrical specification is made up from two separate specifications which when combined together form the projects electrical specification. To understand the requirements of the projects electrical specification the documents shall be read together and not in isolation from one another. The documents forming the projects electrical specification are:

PMTC-SDP-XX-XX-SP-E-001: Electrical Performance Specification.
PMTC-SDP-XX-XX-SP-E-002: Electrical Y Section Specification.

Y6 Cables and Wiring
Y60 CONDUIT AND CABLE TRUNKING

1010 STANDARDS:
- Provide conduit and cable trunking in accordance with the relevant British Standards and in particular the requirements of BS 7671 Requirements for Electrical Installations (The IET Wiring Regulations).

2000 PRODUCTS/MATERIALS

2010A CONDUIT SYSTEMS METAL RIGID CLASS 2:
- Provide conduit systems to BS EN 61386. Use conduit of each type from one manufacturer.
- Material - Metal, steel.
- Method of connection - Threadable.
- Suitability for bending - Rigid, BS EN 61386-21.
- Electrical characteristics - with electrical continuity.
- Resistance against corrosive or polluting substances
  - Conduits with same protection outside and inside BS EN 61386-1 Table 10 Class 2
  - Medium protection
  - e.g. stoved enamel or air drying paint.

2010B CONDUIT SYSTEMS METAL RIGID CLASS 4:
- Provide conduit systems to BS EN 61386. Use conduit of each type from one manufacturer.
- Material - Metal, steel.
- Method of connection - Threadable.
- Suitability for bending - Rigid, BS EN 61386-21.
- Electrical characteristics - with electrical continuity.
- Resistance against corrosive or polluting substances
  - Conduits with same protection outside and inside
  - High protection - Hot dip zinc coating. BS EN 61386-1 Table 10 Class 4.

2010C CONDUIT SYSTEMS - METAL RIGID STAINLESS STEEL:
- Provide conduit systems to BS EN 61386. Use conduit of each type from one manufacturer.
- Material - Metal, stainless steel.
- Method of connection - Threadable.
- Suitability for bending - Rigid, BS EN 61386-21.
- Electrical characteristics - with electrical continuity.
- Resistance to ingress of water (rating to BS EN 60529)
  - Conduits giving protection against water jets (IPX5).
- Resistance against corrosive or polluting substances
  - Conduits with same protection outside and inside
  - High protection - Stainless steel. BS EN 61386-1 Table 10 Class 4.

2010D CONDUIT SYSTEMS - STEEL FLEXIBLE, LSF SHEATHED:
- Provide conduit systems to BS EN 61386. Use conduit of each type from one manufacturer.
- Material - Metal, steel.
- Method of connection - Nonthreadable.
- Suitability for bending - Flexible, BS EN 61386-23.
- Resistance to flame propagation
  - Non-flame propagating conduit.
- Resistance against corrosive or polluting substances
  - Conduits with same protection outside and inside
  - Medium protection
  - Conduits with greater protection outside than inside -Medium/high
  - Stoved enamel inside, LSF sheathed outside. BS EN 61386-1 Table 10 Class 2.

2010E CONDUIT SYSTEMS - NON-METALLIC RIGID:

- Provide conduit systems to BS EN 61386. Use conduit of each type from one manufacturer.
- Material - Insulating, PVC or equivalent material.
- Method of connection - Nonthreadable.
- Suitability for bending - Rigid, BS EN 61386-21.
- Electrical characteristics
  - Without electrical insulating characteristics.

2010F CONDUIT SYSTEMS - NON METALLIC FLEXIBLE:

- Provide conduit systems to BS EN 61386. Use conduit of each type from one manufacturer.
- Material - Insulating, PVC.
- Method of connection - Threadable or Nonthreadable.
- Suitability for bending - Flexible, BS EN 61386-23.
- Electrical characteristics
  - Without electrical insulating characteristics.

2020A RIGID CONDUIT SYSTEM - METALLIC CONDUIT

- Use couplers to match conduit grade and finish.
- Use solid couplers to join lengths of conduit unless inspection couplers are shown on the drawings or schedules.
- Conduit fittings and adaptable boxes
  - Material - Malleable iron adaptable boxes.
  - Do not use factory made bends, inspection bends or inspection couplers unless shown on drawings or schedules.
  - Ensure fittings are same class and finish as associated conduit system.
  - Supply covers for circular or adaptable boxes in the same material and finish as boxes.
  - Use steel dome or cheese headed screws to secure covers for Class 2 finish.
  - Use brass dome or cheese headed screws to secure covers for Class 4 finish.
  - Limit number of entry holes within loop-in boxes to four.
  - Adaptable box, minimum size - 100mm x 100mm x 50mm.
- Connections
  - Use couplers and externally screwed brass bushes to connect conduit to loop-in circular conduit boxes, switchgear, distribution boards, and adaptable boxes. Use flanged couplers with washers and male brass bushings, at both ends of each conduit run/link.
  - Conduit fixing saddles - Spacer bar.
- Plugs - Hexagonal malleable iron.
- Locknuts - Hexagonal steel.

2020C RIGID CONDUIT SYSTEM - STAINLESS STEEL CONDUIT:

- Use couplers to match conduit grade and finish.
- Use solid couplers to join lengths of conduit.
- Conduit fittings and adaptable boxes
  - Material - Stainless steel.
  - Ensure fittings are same class and finish as associated conduit system.
  - Supply covers for circular or adaptable boxes in the same material and finish as boxes.
  - Limit number of entry holes within loop-in boxes to four.
  - Adaptable box, minimum size - 100 mm x 100 mm x 50 mm.
- Connections
  - Use couplers and externally screwed bushes to connect conduit to loop-in circular conduit boxes, switchgear, distribution boards, and adaptable boxes. Use solid couplers.
- Conduit fixing saddles - spacer bar, stainless steel.
- Plugs - Hexagonal stainless steel.
- Locknuts - Hexagonal stainless steel.

2030A RIGID CONDUIT SYSTEM - INSULATING CONDUIT:

- Connections
  - Do not use slip joints. Use expansion couplings as required. Use solvent solution connections.
- Conduit fittings and adaptable boxes
  - Use boxes and connections to suit size of conduit and method of jointing.
  - Use heavy gauge, high impact rigid PVC conduit fittings.
  - Provide all boxes for supporting luminaires or other heavy devices with metal brackets or insert clips to provide a support independent of the box.
  - Provide boxes for flexible conduit, accessories and luminaire connection with a brass earthing terminal and/or steel circular earthing ring.
  - Conduit fixing saddles - Spacer bar or hospital.
- Plugs - Spout entry plug.

2040A PLIABLE OR FLEXIBLE CONDUIT SYSTEMS - METALLIC:

- Type of Packing - Unpacked.
- Type of sheath - Low smoke and fume material.
- Fittings material - Brass adaptors.
- Connections
  - Use brass male adaptors to connect flexible conduit to motors and any other equipment having a threaded entry.
  - Use male adaptors, solid couplers, flanged couplers with washer and externally screwed brass bushes to connect flexible conduit to trunking and equipment not having a threaded entry.

2050A PLIABLE OR FLEXIBLE CONDUIT SYSTEMS - NON-METALLIC:

- Method of connection - Threadable conduit.
- Connections
  - Use plastic adaptors and bushes.
  - Use male adaptors to connect flexible conduit to motors and other equipment having a threaded entry.
  - Use female adaptors and externally screwed bushes to connect flexible conduit to trunking and equipment not having a threaded entry.

2080A CABLE TRUNKING AND FITTINGS:

- Comply with BS EN 50085. Use trunking of each type from one manufacturer.

2090A METAL TRUNKING - FACTORY PAINTED FINISH:

- Material
  - Steel trunking to BS EN 50085. Supply partitions and covers same material as trunking.
- Gauge of metal - BS EN 50085.
- Style
  - Use trunking manufactured with inward return edge flanges and fitted with flange couplers which ensure that when the cover is removed a minimum of 80% of the nominal trunking or compartment width is available for access.
- Protection to BS EN 50085.
  - Electroplated zinc having a minimum thickness of zinc coating of 0.0012mm inside and outside with additional coating of stoved or air drying paint, applied at least to the external surface.
- Finish - Manufacturer's standard, all surfaces.
- Colour
  - Manufacturer's standard or to BS 4800 Shade as approved.
- Fixings
  - Use purpose made brackets to fix to structural steel or suspension rods.

  Provide external fixing lugs where specified protection for the installation is IP44 or greater.
- Fittings
  - Use bends, tees and angles of similar gauge, type and finish as trunking body and supplied by same

manufacturer.
  - Partitions and Covers
  - Ensure partitions are electrically continuous with the body of the trunking or provide a connector for a circuit protective conductor.
  - Ensure gap between partitions and lids maintains segregation of circuits.
  - Material - Same material as trunking.
- Joints
  - Use purpose made jointing pieces fixed with screws into captive nuts. Ensure screws do not protrude through the nuts.
  - Ensure rigidity of trunking is maintained across joint.
  - Ensure external dimensions of trunking are maintained and not reduced by more than 4% across joints between trunking lengths and/or fittings.
  - Use purpose made fittings of the same manufacture where trunking connects to switchgear and distribution boards.
  - Provide flanges for connection of flush floor trunking to vertical trunking to maintain the cross sectional area of compartments with 50 mm minimum radius.
  - Maintain electrical continuity at each joint by a copperlink, (tinned copper for galvanized trunking), fixed on outside of trunking, secured by screws, nuts and shakeproof washers. Screws must not project through the nut. Make provision for continuity to be achieved without need to remove paint from ferrous metal where trunking has a painted finish.
- Screws, Nuts, Washers
  - Do not use self tapping screws. Use cheese or round head screws except where provision is made for the use of counter-sunk heads.
- Material
  - Use steel zinc coated
    - BS 7371-3.
- Cable supports
  - Provide horizontal trunking with removable cable retainers or bridges to retain cables in situ.
  - Provide vertical trunking with pin racks to support cables at 3000 mm maximum spacing.
  - Use insulated pins or insulation sleeved pins on pin racks.

2090B METAL SURFACE TRUNKING - ZINC FINISH:
- Material
  - Steel trunking to BS EN 50085. Supply partitions and covers same material as trunking.
- Gauge of metal - BS EN 50085.
- Trunking type
  - Standard cable trunking with compartments.
- Style
  - Use trunking manufactured with inward return edge flanges and fitted with flange couplers which ensure that when the cover is removed a minimum of 80% of the nominal trunking or compartment width is available for access.
- Protection to BS EN 50085
  - Electroplated zinc having a minimum thickness of zinc coating of 0.0012mm inside and outside.
  - Hot dip zinc coated steel to BS EN 10346 or BS EN 10143.
- Finish - Manufacturer's standard, all surfaces.
- Colour - Self Colour or Manufacturer's standard.
- Fixings
  - Use purpose made brackets to fix to structural steel or suspension rods.
  - Provide external fixing lugs where specified protection for the installation is IP44 or greater.
- Fittings
  - Use bends, tees and angles of similar gauge, type and finish as trunking body and supplied by same manufacturer.
- Partitions and Covers
  - Ensure partitions are electrically continuous with the body of the trunking or provide a connector for a circuit protective conductor.
  - Ensure gap between partitions and lids maintains segregation of circuits.
  - Provide individual mounting plates for each accessory mounted on trunking covers.
  - Material - Same material as trunking.

- Joints
  - Use purpose made jointing pieces fixed with screws into captive nuts. Ensure screws do not protrude through the nuts.
  - Ensure rigidity of trunking is maintained across joint.
  - Ensure external dimensions of trunking are maintained and not reduced by more than 4% across joints between trunking lengths and/or fittings.
  - Use purpose made fittings of the same manufacture where trunking connects to switchgear and distribution boards.
  - Provide flanges for connection of flush floor trunking to vertical trunking to maintain the cross sectional area of compartments with 50 mm minimum radius.
  - Maintain electrical continuity at each joint by a copperlink, (tinned copper for galvanized trunking), fixed on outside of trunking, secured by screws, nuts and shakeproof washers. Screws must not project through the nut. Make provision for continuity to be achieved without need to remove paint from ferrous metal where trunking has a painted finish.
- Screws, Nuts, Washers
  - Do not use self tapping screws. Use cheese or round head screws except where provision is made for the use of counter-sunk heads.
- Material
  - Use steel zinc coated
    - BS 7371-3 or BS 7371-6.
- Cable supports
  - Provide horizontal trunking with removable cable retainers or bridges to retain cables in situ.
  - Provide vertical trunking with pin racks to support cables at 3000 mm maximum spacing.
  - Use insulated pins or insulation sleeved pins on pin racks.

2090C LIGHTING TRUNKING COVER:

- Provide cover strip to prevent ingress of foreign materials, locate cabling in place and act as closure strips between luminaires. Use trunking cover strip clipped into place in trunking body.
- Cover strip material
  - To match lighting trunking body or high quality colour fast extruded plastic.
- Colour - Manufacturer's standard or to BS 4800
- Shade as approved.

2090D FLUSH FLOOR TRUNKING:

- Trunking bodies
  - Supply trunking bodies complete with flanged connections for service outlet boxes.
  - Screwed levelling device.
  - Secure covers to trunking body using countersunk brass screws with slots, crosshead or hexagon key heads or steel cam locking devices for use with a removable tool.
  - Provide cork gasket or equivalent between cover and flange for sound deadening.
- Trunking lids
  - Provide for trunking body recessed lids to suit applied floor finish.
  - Ensure securing devices on recessed covers are accessible without removing applied floor finish.

2090E STEEL DADO TRUNKING:

- Material steel - BS EN 50085.
- Wall/dado trunking - three compartment.
- Installation - surface.
- Style.
  - Use trunking manufactured within ward return edge flanges and filled with flange couplers, which ensure that when the cover is removed a minimum of 80% of the nominal trunking or compartment width is available for access.
- Colour - manufacturer's standard or BS 4800 shade to be approved.

2090F ALUMINIUM DADO TRUNKING:

- Material extruded aluminium - BS EN 50085.
- Wall/dado trunking - three compartment.
- Installation - surface.
- Style - extrusion as manufacturer's standard.
- Colour - manufacturer's standard or BS 4800 shade to be approved.

2100A UNDERFLOOR STEEL TRUNKING:
- Trunking material
  - Sheet steel trunking to BS 4678-2.
- Gauge of Metal - BS EN 50085.
- Degree of Protection - Class 3.
- Connection to vertical trunking
  - Provide flanges for connection of vertical trunking and temporary blanking plates.
  - Maintain cross sectional area of compartments with 50 mm minimum radius for connections to vertical trunking.
- Trunking bodies
  - Supply trunking bodies complete with flanged connections for service outlet boxes.
  - Use screwed levelling devices.

2110A SERVICE OUTLET BOXES:
- Provide service outlet boxes and junction boxes constructed from sheet steel with same finish as trunking.
- Maintain continuity and segregation of compartments through boxes and fit flyovers where necessary.
- Provide service outlet boxes with separate and segregated access to outlets associated with each wiring compartment. Fit cable guard or grommet to each section.
- Incorporate spigots on boxes for connection to trunking.
- Make frames adjustable on each corner, recess lids.
- Manufacture frame and lids for service outlet boxes and junction boxes of cast metal, and suitable to accept type of floor covering.
- Outlet plates
  - Provide outlet plates for each low voltage compartment equipped with socket outlets.
  - Provide outlet plates for each extra low voltage compartment equipped with items.
  - Provide outlet plates for each information technology compartment that ensures the IT compartment and its outlet plate conform to the requirements of BS EN 50174 and of the IT system installer, equipped with suitable outlets.
  - Provide blank outlet plates for any unused compartments.

2120A POWER POLES:
- Provide service poles complete with associated conduit or trunking fittings. Maintain continuity and segregation of circuits throughout. Provide outlet boxes with separate access to wiring compartments.
- Standard - BS EN 50085-2-4.
- Material - extruded Aluminium.
- Finish - manufacturer's standard.
- Fixings - free-standing or complete with fixing brackets at top.

2130A PVC SERVICE TRUNKING - GENERAL PURPOSE:
- Trunking to BS 4678-4
  - Mechanical properties, trunking for medium mechanical stress.
  - Temperature tolerances - BS 4678-4, Table 1.
- Electrical characteristics
  - Without electrical insulating characteristics.
- Resistance against ingress of solid objects
  - Protected against solid objects greater than 1.0mm (IP4X).
- Resistance to ingress of water
  - Protected against dripping water (IPX2).

- Resistance against corrosive or polluting substances
  - Medium protection.
- Fittings
  - Use fittings from same manufacturer as trunking. Use `snap-on' covers. Use trunking fittings and accessories suitable for jointing by solvent welding.
  - Use proprietary cable retaining clips at 500 mm maximum intervals on trunking that exceeds 1.8 m in length. Where junctions occur ensure first clip is not more than 300 mm from junctions.

2130B PVC SURFACE TRUNKING - SKIRTING TRUNKING:
- Trunking to BS 4678-4
  - Mechanical properties, trunking for medium mechanical stress.
  - Temperature tolerances - BS 4678-4, Table 1.
- Electrical characteristics
  - Without electrical insulating characteristics.
- Resistance against ingress of solid objects
  - Protected against solid objects greater than 1.0mm (IP4X).
- Resistance to ingress of water
  - Protected against dripping water (IPX2).
- Resistance against corrosive or polluting substances
  - Low protection.
- Fittings
  - Use fittings from same manufacturer as trunking. Use 'snap-on' covers. Use trunking fittings and accessories suitable for jointing by solvent welding.
  - Use proprietary cable retaining clips at 500 mm maximum intervals on trunking that exceeds 1.8 m in length. Where junctions occur ensure first clip is not more than 300 mm from junctions.

2130C PVC DADO TRUNKING - GENERAL PURPOSE:
- Trunking to BS 4678-4
  - Mechanical properties, trunking for medium mechanical stress.
  - Temperature tolerances - BS 4678-4, Table 1.
- Electrical characteristics
  - Without electrical insulating characteristics.
- Resistance against ingress of solid objects
  - Protected against solid objects greater than 1.0mm (IP4X).
- Resistance to ingress of water
  - Protected against dripping water (IPX2).
- Resistance against corrosive or polluting substances
  - Medium protection.
- Fittings
  - Use fittings from same manufacturer as trunking. Use 'snap-on' covers. Use trunking fittings and accessories suitable for jointing by solvent welding.
  - Use proprietary cable retaining clips at 500mm maximum intervals on trunking that exceeds 1.8m in length. Where junctions occur ensure first clip is not more than 300mm from junctions.

2140A PVC UNDERFLOOR TRUNKING:
- Material
  - Heavy gauge PVC trunking to BS 4678-4.

2150A SEPARATE OR MULTI-COMPARTMENT TRUNKING:
- Use separate trunking or multi-compartment trunking for segregation of services. Ensure steel partitions have a provision for connecting a circuit protective conductor.
- Provide separation of wiring for circuits as required by BS 7671.

2170 SUPPORTS AND FIXINGS:

- Provide proprietary suspension systems comprising channel sections with return lips and compatible fixing accessories made of material to BS EN 10162, BS EN 10210 and/or slotted angles to BS 4345.
- Ensure support components for Class 4 conduit have the same finishing method as the conduit carried out after manufacture. Ensure components in direct contact with conduit match profile of conduit.
- Ensure all steel components such as studding, bolts and steel screws, bolts, nuts and washers are either cadmium plated and passivated or zinc electroplated to BS 7371 after manufacture. Do not use metal fixing components likely to deteriorate and/or cause damage through electrolytic action.

3000 WORKMANSHIP

3010A GENERAL:
- Ensure entire system is electrically and/or mechanically continuous, to BS 7671.
- Fire barriers
  - Comply with the requirements of BS 7671 wherever the conduit or trunking passes through the perimeter of a fire compartment (wall, floor or ceiling).
- Appearance
  - Arrange conduit, trunking and ducting to present neat appearance, parallel with other service runs and lines of building construction, except where in screed or in-situ concrete. Ensure plumb vertical runs.
- Cable installation
  - Install cable in conduit, trunking or equipment enclosures only when completely erected throughout its length.
  - Do not use framework of partitions or similar unless indicated.
- Building expansion and settlement
  - Make provision in conduit and trunking at expansion and settlement joints to allow for movement of building structure. Provide circular through or adaptable boxes no more than 300 mm either side of expansion or settlement joints for conduit crossing.
  - Join boxes with flexible steel conduit type C or conduits arranged to form a telescopic joint and cover overall with PVC sleeve to provide minimum degree of protection of IP44 or purpose made telescopic joint protected by a PVC sleeve to at least IP44.
- Quality
  - Cut conduit clean and square with axis. Remove any burrs prior to erection.
  - Site form 90° in conduit wherever practical or use circular or adaptable boxes.
  - Construct bends and sets cold with a bending machine. Do not apply heat when forming sets or bends.
  - Use bending tools complying with British Standards appropriate to conduit material.
  - Ensure no indentation or reduction in cross sectional area occurs during installation.
  - Use correct tools to assemble conduit. Ensure no tool marks or damage to components occurs.

3020 LAYOUT:
- Ensure the maximum circuit lengths and groupings of cables indicated are not exceeded.
- Conduit sizing
  - Where dimensions are not indicated select trunking and conduit sizes in accordance with manufacturer's recommendations, BS 7671 (IET Wiring Regulations), and the latest edition of Guidane Note 1 Selection and Erection published by the IET.

3030 SPACING:
- Install conduit, trunking and equipment clear of other services. Measure distance from external surface of any thermal insulation. Notify instances where minimum clearance cannot be achieved and bond items concerned. Minimum general spacings between conduits, trunking, equipment and insulated steam services - 300 mm, other services excluding steam - 150 mm, above central heating radiators - 1000 mm, ensure separation is in accordance with manufacturer's recommendations, BS 7671 (IET Wiring Regulations), latest edition of Guidance Note 1 Selection and Erection published by the IET, and BS EN 50174.

3040 CONDENSATION PREVENTION:

- Install conduit and trunking systems to ensure internal condensation does not affect operation of associated circuits. Provide drainage points in accordance with BS 7671.
- Where conduit passes through external wall between two areas of different ambient temperatures or in other locations likely to cause condensation, install a conduit or adaptable box. After wiring fill box with inert, permanently plastic compound with high insulation value.

3050A PROTECTION AND REPAIR OF STEEL COMPONENTS:

- Paint joints of conduit and minor damages to finish of conduit and trunking immediately after erection or after damage occurs.
- Use paint compatible with finish as follows
  - Galvanized finish, use two coats zinc rich paint.
  - Black enamelled finish, use two coats of good quality, air drying, black enamel paint.
- Remove grease, oil, dirt and rust before applying protective paint.
- Notify serious damage and repair or replace as instructed.

3060 EQUIPMENT CONNECTIONS:

- Where surface mounted equipment is installed in conjunction with concealed conduit work, terminate concealed conduit at flush mounted conduit or adaptable box. Drill back of equipment, bush for back entry and mount equipment to conceal back box.
- Connect to fixed equipment via conduit box located adjacent to termination point, using either solid or flexible conduit as indicated for final connection to equipment terminations.
- Use conduit box as cable change point to facilitate changed wiring locally to adjacent equipment.
- Connect trunking to equipment by specially fabricated connectors or by couplers and externally screwed brass bushes.

3070 CLEANING BEFORE WIRING:

- Clean inside of conduits and trunking with swabs immediately before wiring.
- Inspect all components and remove any foreign matter, fit temporary plugs to open ends of conduit and trunking to prevent ingress of water and solid material.

3080A WIRING:

- Comply with BS 7671 when wiring installations.
- Segregate circuits as indicated.
- Ensure draw wires are left within empty conduits for use of specialist installers. Use draw wires comprising nylon tapes with fitted eyelets.
- For concealed conduit ensure system is installed to enable re-wiring to be carried out from boxes for fittings or accessories only. Draw-in boxes will only be permitted with prior permission in writing.
- Do not use tallow or any other substances to facilitate drawing-in of cables.

3090 BUILDERSWORK:

- Ensure conduit is not concealed until work has been inspected and approved.
- Obtain permission before horizontally chasing walls.
- Ensure that conduit and fittings buried in concrete or behind plaster are protected against corrosion or electrolytic action prior to rendering.
- Ensure conduit concealed in wall chases is covered by plaster and/or rendering to minimum depth of 12 mm.

4000 WORKMANSHIP FOR CONDUIT

4010 DRAW-IN BOXES:

- Provide draw-in boxes in conduit at maximum intervals of 10 metres or after bends and/or sets totalling 180°.

4020 INSTALLATION OF CAST IN OR BURIED CONDUIT:

- Ensure cast-in conduits are firmly secured to reinforcing steelwork and that accessory and/or conduit boxes are secured so they do not move during subsequent building operations.
- Ensure there is no blockage immediately shuttering is removed.
- Check there is no mechanical damage to conduit in floor screed prior to screeding. Fix securely before screed is poured. Provide temporary protection to conduits until screeds are laid.
- Ensure minimum amount of cross-overs occur dependent upon screed depth. Do not install draw boxes in floors.
- Do not install conduits in screeds in areas indicated within site blinding, in main structural slabs unless prior permission in writing is obtained.

4030 CONDUIT BOXES:

- Ensure that wherever conduit boxes are cast in the face of the box is flush with the face of the concrete or plaster. Fit circular conduit boxes with extension rings to ensure a flush face with plaster or concrete or where terminal blocks are to be accommodated.
- Ensure fixing holes are countersunk where material thickness allows or use round head screws to prevent damage to cables and remove burrs before cables are drawn in.
- Use a minimum of two screw fixing for standard circular conduit boxes and four screws for large conduit boxes and adaptable boxes up to 150 mm x 100 mm.
- Use back outlet boxes where surface conduits pass through walls, to outside accessories or lighting points.
- Secure switch boxes and socket boxes using countersunk steel screws where provision is made for them or if not use round head screws. Use plug inserts and finally grout in position prior to plastering or screeding.

4040 FIXING CONDUIT:

- Support conduit in accordance with manufacturer's recommendations, BS 7671 (IET Wiring Regulations), and the latest edition of Guidance Note 1 Selection and Erection published by the IET.
- Ensure conduit is not under mechanical stress. Fix conduit boxes independently of conduit. Make allowance for any additional mechanical loading supported by conduit boxes.
- Where protection is specified as IP44 or greater ensure fixings of conduit boxes are suitable to maintain degree of protection.
- Use following methods of fixing conduit:

Location	Type of fixing
Floor screeds	Saddles or crampets
Buried in plaster or render	Crampets or saddles
Above false ceilings	Saddles
Surface	Saddles

-

4050 FLEXIBLE AND PLIABLE CONDUIT:

- Use flexible conduit for final connections to motors, other equipment subject to vibration or adjustment and to thermostats, motorised valves and similar items mounted in pipelines or ducts.
- Use sufficient length between equipment and circular through box at end of conduit run (minimum 450 mm) to allow necessary full range of withdrawal, adjustment or movement.
- Use solid type adapters to terminate flexible conduit.
- Use PVC covered flexible conduit where installed externally, exposed to weather or in any position where ingress of moisture or condensation may occur.

4060 SCREWED STEEL CONDUIT:

- Use materials clean and free from defects, rust, scale and oil. Obtain prior permission in writing for use of materials subject to remedial work before erection. Repair any damage caused by threading, bending or erection by painting with zinc rich paint before any rust occurs.

- Ensure length of thread on conduit matches that in conduit couplers, fittings or equipment with no thread exposed after erection except at running couplers.
- Ensure conduits butt inside couplers.
- Use lubricant when cutting threads.
- Use minimum number of running couplings
  - For running couplings in Class 2 conduit, use coupler and locknut. Paint exposed thread with zinc rich paint.
  - For running couplings in Class 4 conduit, use three piece conduit unions.

4070A NON-METALLIC CONDUIT:

- Comply with manufacturer's instructions for bending, setting and jointing of conduit. Use plastic conduit only where indicated.
  - Do not install conduit when ambient working temperature is or will be below -5°C or above 60°C.
- Use solvents recommended by manufacturer of conduit when using solvent welded joints and ensure spigots enter full depth of sockets. Hold joints rigid and in position until weld sets. Remove excess solvent before surface damage occurs.
- Use slip joints as necessary, but not exceeding 6 metres on straight lengths to allow for expansion and contraction over temperature variation as indicated.
- Use semi-mastic adhesive where expansion joints are formed.
- Where fitments do not have shaped or smooth conduit entries connect with male bushes and external couplings.
- Ensure special care is taken to prevent mechanical damage or warping to conduit where mechanical loads are imposed on conduit system, e.g. lighting fittings.

4080 UNDERGROUND INSTALLATION:

- Where buried below ground, use Class 4 conduit. Do not use any buried conduit boxes unless prior permission in writing has been obtained. Wrap conduit with PVC self-adhesive tape, half lapped. Extend taping 150 mm beyond point where conduit leaves ground. Install circular through conduit boxes at the end of the tape. Fill conduit boxes after cable installation with inert, permanently plastic compound with high insulation value, and wrap in PVC self adhesive tape.

5000 WORKMANSHIP FOR TRUNKING

5020 ACCESS:

- Arrange trunking to allow access to wiring. Locate covers on top or sides of trunking if practicable. Arrange access so covers are on a continuous face and cables can be laid in throughout the length of the trunking. Notify where either condition cannot be achieved.

5030A FIXING TRUNKING:

- Ensure trunking is independently fixed and supported from building fabric. Obtain approval for proposed fixings/supports.
- Support trunking in accordance with the manufacturers requirements, BS 7671 (IET Wring Regulations), and the latest edition of Guidance Note 1 Selection and Erection published by the IET.
  - Use two fixings minimum per standard length.

5040A STEEL TRUNKING:

- Install steel trunking in accordance with the manufacturers requirements and those of BS 7671.
- Use trunking to avoid multiple parallel conduit runs, subject to approval.
- Cut trunking clean and square with axis, prepare ends and remove burrs and sharp edges. Ensure inside of trunking is free from anything liable to damage cables either during installation or after covers are fitted.
- When trunking is held in a vice, ensure surfaces remain undamaged and components are not warped.
- Avoid tool marking or damage to trunking system components.
  - Do not site fabricate trunking tees, bends, flanges and other accessories. Use only factory made

accessories.
- Form circular holes over 6 mm diameter in trunking body using correctly sized punch sets. Use twist drill for holes up to 6 mm maximum diameter.
- Use only factory formed openings for accessories.
- Line unprotected apertures in trunking with PVC or nylon edging strip.
- Fit ends of runs with removable blanking plates.
- Ensure connections are not made to covers unless indicated or approval obtained.
- Provide fixed section of cover projecting 25 mm either side of fabric where trunking passes through wall, floors or ceiling.
- Fit cable retaining straps at 500 mm intervals except where cover is on top.

5050 UNDERFLOOR AND FLUSH FLOOR TRUNKING INSTALLATION:
- Lay underfloor and flush floor trunking straight and level. Adjust height of services outlets, junction boxes and flush floor trunking to suit top of screed level. Ensure that spaces below trunking are free from voids and correctly packed. Prevent ingress of screed by masking where necessary.
- Ensure trunking levelling and alignment is carried out in co-operation with person(s) responsible for confirming location and finish of floor levels.
- Immediately following installation of trunking fit temporary covers to service outlets, junction boxes and flush floor trunking. Fit temporary blanking plates over open connections to vertical trunking.
- Retain temporary covers until permanent covers are installed.
- Ensure underfloor trunking systems are fully rewireable to final circuit outlets.
- Connect conduits only at inspection or other easy access points.

5060 TRUNKING OF INSULATING MATERIAL:
- Comply with manufacturer's instructions. Do not install trunking where ambient temperature is below -5°C or working temperature is above 60°C.
- Use solvents recommended by trunking manufacturer when making solvent welded joints. Remove excess solvent before surface damage occurs. Hold joints rigid and in position until welds set.
- Use manufacturer's standard radiused bends, connector tees, off-sets, end plates and component parts of trunking system assembly.
- Ensure no type of trunking other than that specified is installed without approval.
- Trunking may be substituted for conduit at certain positions subject to approval.

BS APPENDIX

BS 1363-1:2016+A1:2018
13 A plugs, socket-outlets, adaptors and connection units. Specification for rewirable and non-rewirable 13 A fused plugs

BS 1363-2:2016+A1:2018
13 A plugs, socket-outlets, adaptors and connection units. Specification for 13 A switched and unswitched socket-outlets

BS 1363-3:2016+A1:2018
13 A plugs, socket-outlets, adaptors and connection units. Specification for adaptors

BS 1363-4:2016+A1:2018
13 A plugs, socket-outlets, adaptors and connection units. Specification for 13 A fused connection units switched and unswitched

BS 4345:1968
Specification for slotted angles

BS 4678-4:1982
Cable trunking. Part 4 Specification for cable trunking made of insulating material.

BS 4800:2011
Schedule of paint colours for building purposes

BS 7371-1:2009
Coatings on metal fasteners. Part 1 Specification for general requirements and selection guidelines

BS 7371-2:1993
Coatings on metal fasteners. Part 2 Specification for torque/clamping force relationship

BS 7371-3:2009
Coatings on metal fasteners. Part 3 Specification for electroplated zinc coatings

BS 7371-3:2009
Coatings on metal fasteners. Part 3 Specification for electroplated zinc coatings

BS 7371-4:1994
Coatings on metal fasteners. Part 4 Specification for electroplated nickel, nickel/chromium and copper/nickel/chromium coatings

BS 7371-6:1998+A1:2011
Coatings on metal fasteners. Part 6 Specification for hot dipped galvanized coatings

BS 7371-6:1998+A1:2011
Coatings on metal fasteners. Part 6 Specification for hot dipped galvanized coatings

BS 7371-7:2010
Coatings on metal fasteners. Part 7 Specification for mechanically applied zinc and zinc based coatings

BS 7371-8:2011
Coatings on metal fasteners. Part 8 Specification for sheradised coatings

BS 7371-9:1996
Coatings on metal fasteners. Part 9 Specification for phosphate or phosphate and oil coatings

BS 7371-10:1994
Coatings on metal fasteners. Part 10 Specification for organic coatings

BS 7371-12:2008
Coatings on metal fasteners. Part 12 Requirements for imperial fasteners

BS 7671:2018
Requirements for electrical installations. IET Wiring Regulations

BS EN 10143:2006
Continuously hot-dip coated steel sheet and strip. Tolerances on dimensions and shape

BS EN 10162:2003
Cold rolled steel sections. Technical delivery conditions. Dimensional and cross-sectional tolerances

BS EN 10210-1:2006
Hot finished structural hollow sections of non-alloy and fine grain steels. Part 1 Technical delivery requirements

BS EN 10210-2:2006
Hot finished structural hollow sections of non-alloy and fine grain steels. Part 2 Tolerances, dimensions and sectional properties

BS EN 10346:2015
Continuously hot-dip coated steel flat products for cold forming. Technical delivery conditions

BS EN 12385-1:2002+A1:2008
Steel wire ropes. Safety. Part 1 General requirements

BS EN 13411-3:2004+A1:2008
Terminations for steel wire ropes. Safety. Part 3 Ferrules and ferrule-securing

BS EN 13411-4:2011
Terminations for steel wire ropes. Safety. Part 4 Metal and resin socketing

BS EN 50085-1:2005+A1:2013
Cable trunking systems and cable ducting systems for electrical installations. General requirements

BS EN 50085-2-1:2006+A1:2011
Cable trunking systems and cable ducting systems for electrical installations. Part 2-1 Cable trunking systems and cable ducting systems intended for mounting on walls and ceilings

BS EN 50085-2-3:2010
Cable trunking and cable ducting systems for electrical installations. Part 2-3 Particular requirements for slotted cable trunking systems intended for installation in cabinets.

BS EN 50085-2-4:2009
Cable trunking systems and cable ducting systems for electrical installations Part 2-4 Particular requirements for service poles and service posts

BS EN 50174-1:2018
Information technology. Cabling installation. Installation specification and quality assurance

BS EN 50174-2:2018
Information technology. Cabling installation. Installation planning and practices inside buildings

BS EN 50174-3:2013+A1:2017
Information technology. Cabling installation. Part 3 Installation planning and practices outside buildings

BS EN 60529:1992+A2:2013
Degrees of protection provided by enclosures (IP code)

BS EN 61386-1:2008
Conduit systems for cable management. Part 1 General requirements.

BS EN 61386-21:2004+A11:2010
Conduit systems for cable management. Part 21 Particular requirements. Rigid conduit systems

BS EN 61386-22:2004+A11:2010
Conduit systems for cable management. Part 22 Particular requirements. Pliable conduit systems

BS EN 61386-23:2004+A11:2010
Conduit systems for cable management. Part 23 Particular requirements. Flexible conduit systems

Y61 CABLES AND WIRING

1010 CABLE MANUFACTURER:

- Use new cables, delivered to site with seals intact, manufactured not more than one year prior to delivery, labelled with manufacturer's name, size, description, BS number, classification, fire classification to BS EN 50575 and BS EN 13501-6, length, grade and date of manufacture.
- Ensure all cables are certified in accordance with the Construction Products Regulation (CPR) as required by BS 7671 (IET Wiring Regulations) and BS 6701.
  - Ensure all cables meet at least either BS EN 60332-1-2 or BS EN 13501-6 EuroClass E_{ca}, or higher rating as indicated on the relevant cable schedule
  - Ensure cables to be installed where the risk of flame propagation is high (for example, cables that are bunched or are used in long vertical runs), or in a fire propagating structure, or run in a fire segregated compartment, meet at least either BS EN 60332-1-2 plus the relevant part of the BS EN 600332-3 series and BS EN IEC 60332-3 series, or BS EN 13501-6 EuroClass D_{ca}, or higher rating as indicated on the relevant cable schedule
  - Ensure cables encroaching on or run in escape routes meet at least either BS EN 13501-6 EuroClass D_{ca}-s2, or the relevant part of BS EN 600332-3 series and BS EN IEC 60332-3 series plus achieve at least 60 % light transmittance when tested to BS EN 61034-2, or higher rating as indicated on the relevant cable schedule
  - Ensure all cables within the scope of BS 6701 meet BS EN 13501-6 EuroClass E_{ca}, or the requirements of BS EN 60332-1-2, except for cables intended for installation into pathways that are hidden below floors, behind walls, or to which access is limited, which are to meet at least BS EN 13501-6 EuroClass C_{ca}-s1b,d2,a2.

1020 CABLE CERTIFICATION MARKING:

- Mark all types of cables with CENELEC cable certification marking or if included in British Approvals Service for Cables (BASEC) in accordance with BASEC Regulations.

1030 MEDIUM VOLTAGE CABLE RECORDS:

- Keep records of MV cable drum numbers and supporting information, mark information on record drawings, indicating precise location of each length of cable, and submit copies of manufacturer's cable test certificate.

2000 PRODUCTS / MATERIALS

2005 LSOH SHEATHING:

- Supply cables with Low Smoke zerO Halogen (LSOH) sheathing, tested in accordance with BS EN 60754-1, BS EN 60754-2, BS EN IEC 60332 and BS EN 60332.

2010A STANDARD ORDINARY FLEXIBLE WIRES - SINGLE COPPER CORE:

- Standard - BS EN 50525-2-31, Clause 4.2, 4.4, and 5.4
  - Ensure all cables are certified in accordance with the Construction Products Regulation (CPR) as required by BS 7671 (IET Wiring Regulations).

2010B STANDARD LSF FLEXIBLE WIRES - SINGLE COPPER CORE:

- Standard - BS EN 50525-3-41, Clause 4.2 and 4.4
  - Ensure all cables are certified in accordance with the Construction Products Regulation (CPR) as required by BS 7671 (IET Wiring Regulations).

2010C STANDARD HEAT RESISTING (90°C OR MORE) FLEXIBLE WIRES - SINGLE COPPER

CORE:

- Standard - BS EN 50525-2-31 Clause 5.2; BS EN 50525-2-41, Class 5 conductors: Clause 4.1 and 4.3. BS EN 50525-2-42, Class 5 conductor: Clause 4.1
  - Ensure all cables are certified in accordance with the Construction Products Regulation (CPR) as required by BS 7671 (IET Wiring Regulations).

2010D STANDARD ORDINARY FLEXIBLE MULTI-CORE COPPER CABLES:

- Standard - BS EN 50525-2-21, Clauses 4.1, 4.2, 4.3 and 6.3
  - Ensure all cables are certified in accordance with the Construction Products Regulation (CPR) as required by BS 7671 (IET Wiring Regulations).

2010E STANDARD HEAT, OIL AND FLAME RESISTANT (HOFR) FLEXIBLE MULTI-CORE COPPER CABLES:

- Standard - BS EN 50525-2-21, Clause 6.3
  - Ensure all cables are certified in accordance with the Construction Products Regulation (CPR) as required by BS 7671 (IET Wiring Regulations).

2010F MULTICORE COPPER LOW SMOKE ZERO HALOGEN FLEXIBLE CABLES:

- Standard - BS EN 50525-3-11, Clause 4.2
  - Ensure all cables are certified in accordance with the Construction Products Regulation (CPR) as required by BS 7671 (IET Wiring Regulations).

2020A STANDARD POWER SUPPLY CABLES, COPPER CONDUCTORS, THERMOSETTING INSULATION, SHEATHED:

- Standard - BS 5467, Tables 4, 6, 8, and 10.
  - Mechanical protection - unarmoured. Regulations).

2020B STANDARD POWER SUPPLY CABLES, COPPER CONDUCTORS, THERMOSETTING INSULATION, SHEATHED AND ARMOURED:

- Standard - BS 5467, Tables 4, 6, 8, and 12.
  - Mechanical protection - armour. Regulations).

2020C STANDARD POWER SUPPLY CABLES, COPPER CONDUCTORS, PVC INSULATION, SHEATHED:

  - Standard - BS 6004, Tables 7 and 8. Regulations).

2020E STANDARD POWER SUPPLY CABLES, COPPER CONDUCTORS, LSF SHEATHED AND ARMOURED:

- Standard - BS 6724, Tables 4, 6, 8, and 10.
  - Mechanical protection - armour. Regulations).

2020F STANDARD CABLES FOR CONDUIT AND TRUNKING, COPPER CONDUCTORS, PVC INSULATED:

- Standard - BS EN 50525-2-31, Clause 4.1, 4.3 and 4.4
  - Mechanical protection - conduit and trunking. Regulations).

2020G STANDARD CABLES FOR CONDUIT AND TRUNKING, COPPER CONDUCTORS, LSF INSULATED:

- Standard
  - BS EN 50525-3-41, Clauses 4.1 and 4.3
  - BS 8592
    - Mechanical protection - conduit and trunking. Regulations).

2020H STANDARD CABLES FOR CONDUIT AND TRUNKING, COPPER CONDUCTORS. 90°C PVC INSULATED:

- Standard - BS EN 50525-2-31, Clause 5.1, 5.3 and 5.4
  - Mechanical protection - conduit and trunking. Regulations).

2020I STANDARD FLAT CABLES, 2-CORE OR 3-CORE, COPPER CONDUCTORS, WITH OR WITHOUT CPC, PVC INSULATED, SHEATHED:

- Standard - BS 6004, Tables 7, 8 and 9. Regulations).

2020J STANDARD FLAT CABLES, 2-CORE OR 3-CORE, COPPER CONDUCTORS WITH OR WITHOUT CPC, LSF INSULATED SHEATHED:

- Standard - BS 7211, Table 5. Regulations).

2020K STANDARD POWER SUPPLY CABLES, COPPER CONDUCTORS LSF INSULATION, SHEATHED:

- Standard - BS 7211, Tables 3 and 4.
  - Mechanical protection - unarmoured. Regulations).

2020M STANDARD CABLES WITH DEFINITE FIRE PERFORMANCE:

- Standard - BS 7629-1 type as shown on drawings / schedules.
- Fire performance BS 5839-1 - standard.
- Sheath colour - red.
- Mechanical protection, as shown on drawings / schedules.
- Ensure all cables are certified in accordance with the Construction Products Regulation (CPR) as required by BS 7671 (IET Wiring Regulations).

2020N STANDARD CABLES FOR WALLS, PARTITIONS AND BUILDING VOIDS WHERE PENETRATION BY SHARP OBJECTS IS A HIGH RISK:

- Standard - BS 8436 Regulations).

2030A STANDARD 3.3 KV, COPPER CONDUCTORS, ARMOURED AND LSF SHEATHED CABLES:

- Standard - BS 6622, Tables 2 and 3.
- Mechanical protection - armour.

2030B STANDARD 3.3 KV, COPPER CONDUCTORS, ARMOURED AND LSF SHEATHED CABLES:

- Standard - BS 6724, Tables 10 and 11.
- Mechanical protection - armour.

2030C STANDARD 11 KV, COPPER CONDUCTORS, ARMOURED AND SHEATHED CABLES:
- Standard - BS 6622, Tables 4 and 5.
- Mechanical protection - armour.

2040B LIGHT DUTY MINERAL INSULATED CABLES, LSF OUTER COVERING:
- Standard - 500V light duty to BS EN 60702-1, Section 14.
- Outer covering
  - Halogen free material to BS EN 60702-1, Section 8.3

2040D HEAVY DUTY MINERAL INSULATED CABLES, LSF OUTER COVERING:
- Standard - 750V heavy duty to BS EN 60702-1, Section 15.
- Outer covering
  - Halogen free material to BS EN 60702-1, Section 8.3

2050A PAIRED, UNSCREENED CONTROL CABLES WITH OR WITHOUT METALLIC PROTECTION:
- Standard - BS EN 50288-7
  - With or without metallic protection. Regulations)

2050B PAIRED, SCREENED CONTROL CABLES WITH OR WITHOUT METALLIC PROTECTION:
- Standard - BS EN 50288-7
  - Paired, screened control cables, with or without metallic protection. Regulations)

2050C MULTICORE AUXILIARY CABLES WITH OR WITHOUT METALLIC PROTECTION:
- Standard - BS EN 50288-7
  - Multicore auxiliary cables with or without metallic protection. Regulations)

2050G MULTICORE UNARMOURED LSF, SHEATHED AUXILIARY CABLES:
- Standard - BS 7211, Table 4.
  - Mechanical protection - unarmoured. Regulations)

2050H MULTICORE ARMOURED LSF, SHEATHED AUXILIARY CABLES:
- Standard - BS 6724, Table 9.
  - Mechanical protection - armour. Regulations)

2050I CONTROL AND AUXILIARY CABLES WITH DEFINITE FIRE PERFORMANCE:
- Standard - BS 7629-1; type as shown on drawings / schedules.
- Fire performance approval - Loss Prevention Certification Board (LPCB).
- Fire performance STANDARD 30, STANDARD 60 or ENHANCED 120 as indicated on the relevant schedule, or as otherwise required by the design of the system in accordance with BS 5839-1 or BS 5266-1.
- Sheath colour - red.
- Mechanical protection, as shown on drawings / schedules.

2050K FIRE ALARM CABLE:

- Standard - BS 7629-1.
- Mechanical protection - unarmoured.
- Fire performance STANDARD 30, STANDARD 60 or ENHANCED 120 as indicated on the relevant schedule, or as otherwise required by the design of the system in accordance with BS 5839-1 or BS 5266-1.

2070B STANDARD COMMUNICATIONS CABLES FOR INDOOR USE:
- Standard - BT CW1308; BT CW1370; BT CW1700; and BT CW1750. 50575.

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2080A STANDARD COAXIAL CABLES, FOR BROADCAST RECEIVING:
- Standard - BS EN 50117. CAI Benchmark status, cable types CT100, CT125, CT165. 50575.

2090A OPTICAL FIBRE CABLES:
- Standard - BS EN 60794-2-11 and BS EN 187103. Category of multimode fibre to
  - BS EN 60793-2-10:
    - A1a.1
    - A1a.2
    - A1a.3
    - A1b
    - A1c
    - A1d
  - Fibre optic interconnecting devices and components to BS EN 61300, BS EN 62148, BS EN IEC 62148-1, BS EN 62664-1-1 and PD IEC/TR 62627-03-03 50575.

2100A INFORMATION TECHNOLOGY CABLES - STRUCTURED WIRING: CATEGORY 5:
- Provide IT cables in accordance with the IT system suppliers specification.
- Type of system - structured cabling - relevant parts of BS EN 50173
- Standard - for Category 5 and Category 5e, BS EN 50288-3-1 and BS EN 50288-3-2
- Termination reference - EIA/TIA TSB-40.
  - Cable construction - multi pair, unshielded (UTP). 50575.

2100B INFORMATION TECHNOLOGY CABLES - STRUCTURED WIRING: CATEGORY 6:
- Provide IT cables in accordance with the IT system suppliers specification.
- Type of system - structured cabling - relevant parts of BS EN 50173
- Standard - BS EN 50288-6-1 (Category 6) or BS EN 50288-11-1 (Category 6a).
- Termination reference - EIA/TIA TSB-40.
  - Cable construction - multi-pair, unshielded (UTP). 50575.
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2100C INFORMATION TECHNOLOGY CABLES - HBES CLASS 1:
- Provide IT cables in accordance with the IT systems suppliers specification.
- Type of system - HBES Class 1.
- Standard - BS EN 50090-9-1.
  - Cable construction - 2 twisted pairs unshielded. 50575.

2100D INFORMATION TECHNOLOGY CABLES - INDOOR MULTI-PAIR/QUAD RISER CABLES:
- Provide IT cables in accordance with IT system suppliers specification.
- Application - Multiple Dwelling Units (MDU) shaft supporting universal services, xDSL and applications up to 100 MBits over IP.
- Standard - BS EN 50407-3

3010A CABLES GLANDS - UNARMOURED CABLES, INDOORS:
- Cable type
  - Flexible; wiring and power; control and auxiliary; and communications.
- Standard - BS EN 62444 non-metallic, cable retention, IP54; Type A1 as BS 6121-5 Annex A..
- Environment - indoor.

3010B CABLES GLANDS - UNARMOURED CABLES, OUTDOORS:
- Cable type
  - Flexible; wiring and power; control and auxiliary; and communications.
- Standard - BS EN 62444 non-metallic, cable retention, IP54; Type A2 as BS 6121-5 Annex A.
- Environment - outdoor.

3010C CABLES GLANDS - ARMOURED CABLES, DRY INDOORS:
- Cable type
  - Wiring and power; and control and auxiliary.
- Standard - BS EN 62444 metallic, cable retention Class A, protective connection to earth, IP54. Type B as BS 6121-5 Annex A.
- Environment - dry indoors.

3010D CABLE GLANDS - ARMOURED CABLES, INDOORS:
- Cable type
  - Wiring and power; and control and auxiliary.
- Standard - BS EN 62444 metallic, cable retention Class A, protective connection to earth, IP54. Type B as BS 6121-5 Annex A.
- Environment - indoor.

3010E CABLE GLANDS - ARMOURED CABLES, OUTDOORS:
- Cable type
  - Wiring and power; and control and auxiliary.
- Standard - BS EN 62444 metallic, cable retention Class A, protective connection to earth, IP54 with shroud. Type C as BS 6121-5 Annex A.
- Environment - outdoor.

3020A CABLE SEALS AND GLANDS - HEAVY DUTY MINERAL INSULATED CABLES - PROTECTED FOR 'D' 'I' 'N' HAZARDOUS AREAS:
- Use seals and glands for mineral insulated cables in accordance with BS EN 60702-2, recommended or supplied by cable manufacturer.
- Gland Type
  - Cable grip type, externally threaded for threaded entry. Certified for hazardous areas to BS EN 60079-14, `d', `i' or `n'.
- Gland Shroud
  - Thermoplastic or LSF material to match sheath.
- Seal type
  - Plain or earth tail and self-threading pot.
- Pot closure - Plastic stub cap.
- Pot sealant - Compound, 105°C.
- Conductor insulation sleeving - Plain PVC.

- Seal maximum temperature rating - 105°C.
- Other seal characteristics
  - Certified to BS EN 60079-14 for hazardous areas.

3020B CABLE SEALS - HEAVY AND LIGHT DUTY MINERAL INSULATED CABLES - PROTECTED 'E' FOR HAZARDOUS AREAS:

- Use seals for mineral insulated cables in accordance with BS EN 60702-2, recommended or supplied by cable manufacturer.
- Seal type
  - Plain; or earth tail and self-threading pot; or polymeric one piece.
- Pot closure - plastic disc.
- Pot sealant - epoxy putty.
- Conductor insulation sleeving - headed PTFE.
- Seal maximum temperature rating - 100°C or 85°C.
- Other seal characteristics
  - Certified to BS EN 60079-14 for hazardous areas, `e'.

3020C CABLE SEALS AND GLANDS - HEAVY OR LIGHT DUTY MINERAL INSULATED CABLES - TEMPERATURES UP TO 105°C:

- Use seals and glands for mineral insulated cables in accordance with BS EN 60702-2, recommended or supplied by cable manufacturer.
- Gland type
  - Cable grip type, externally threaded with lock washer and nut.
- Gland shroud
  - Thermoplastic or LSF material to match sheath.
- Seal type - plain or earth tail and self-threading pot.
- Pot closure - plastic stub cap.
- Pot sealant - compound, 105°C
- Conductor insulation sleeving - plain PVC.
- Seal maximum temperature rating - 105°C.

3020D CABLE SEALS AND GLANDS - LIGHT DUTY MINERAL INSULATED CABLES - TEMPERATURES UP TO 105°C:

- Use seals and glands for mineral insulated cables in accordance with BS EN 60702-2 recommended or supplied by cable manufacturer.
- Gland Type
  - Cable grip type, internally threaded, with bush.
- Gland Shroud
  - Thermoplastic or LSF material to match sheath.
- Seal type - Plain or earth tail and self-threading pot.
- Pot closure - Plastic stub cap.
- Pot sealant - Compound, 105°C
- Conductor insulation sleeving - Plain PVC.
- Seal maximum temperature rating - 105°C.

3035 CABLE CLEATS AND CABLE TIES:

- Use cable cleats to BS EN 61914.
- Use cable ties to BS EN 62275.

3060A CABLE JOINTS AND TERMINATIONS:

- Use only cable joints as supplied or recommended by cable manufacturer.
- Cable type - power or control and auxiliary.
- Joint arrangement - Straight through or tee.
- Joint type - BS 7888, BS EN 50393 or BS EN 61442 were appropriate, cold pour or heat shrink.

- Accessories
  - Armour bonds, BS 7197
  - Filling compounds.
  - Core sleeving, BS EN 60684
- Environment - Underground.

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3110A CABLE DUCTS:
- Standard
  - BS 4660 provided by Electricity Distribution Company.

3120A CABLE SLEEVES:
- Supply and hand to others for installation non-ferrous cable sleeves for incorporation into the structure where cables pass through fire compartment floors and walls. Sleeving to be in accordance with BS EN 60684
- Packing material
  - Weak mix mortar; intumescent, plaster or mastic; solid intumescent material; or intumescent granule filled bags.

3130A CABLE COVERS AND MARKERS:
- Material - recovered plastic, integral tape.
  - Marking - electricity or telephone.
- Plastic marker tape
  - Yellow, marked electricity or telephone.

4000 WORKMANSHIP

4010 CABLE INSTALLATION - GENERAL:
- Use and install cables only as directed in the appropriate standard or as directed by the manufacturer in writing. Lay cables in one length unless otherwise indicated. Obtain permission from supervising officer for all through joints, and where overall length requirement exceeds practical drum size.
- Handle, install and dispose of cables on wooden drums in accordance with BS 8512
- Install cables when ambient temperature is 5°C or greater, using cables stored at or above this temperature for not less than 24 hours.
- Use drum stands, drum axles, fair leads, rollers, cable stockings and other equipment as recommended by the cable manufacturer and as appropriate to the method of installation.
- Ensure wiring systems are supported so that they are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).

4020 CABLE INSTALLATION IN LOW TEMPERATURES:
- Install cables at lower installation temperatures when authorised by manufacturer in a written statement.
- Ensure wiring systems are supported so that they are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).

4030 INSTALLATION OF LSF CABLE:
- Install LSF cables in accordance with manufacturer's instructions. Ensure ambient temperature is above 5°C. Ensure oversheaths are not damaged by abrasion or scuffing.
- Ensure wiring systems are supported so that they are not liable to premature collapse in the event of a

fire, in accordance with BS 7671 (IET Wiring Regulations).

4030A INSTALLATION OF LSZH / LSOH CABLES:

- Install LSZH/LSOH cables in accordance with the manufacturer's instructions, ensuring the ambient temperatures are above the minimum specified by the manufacturer.
- Install LSZH/LSOH cables so that they are not exposed to concrete or other substances containing products similar to lime.
- Where LSZH/LSOH cables are installed outside containment, directly on concrete floors (e.g. under raised floors in offices, control rooms or data centres) ensure suitable cable mat products with appropriate fire performance are used.
- Ensure wiring systems are supported so that they are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).

4040 INSTALLATION OF UNARMOURED CABLES:

- Install and use unarmoured cable to BS EN 50565-1, BS EN 50565-2, or the manufacturer's written instructions.
- Ensure wiring systems are supported so that they are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).

4060 CABLE INSTALLATION IN TRENCHES:

- Lay cables on newly prepared bedding. Ensure multiple layers of cable are separated vertically by a 50mm layer of hard rammed bedding material.
- When using a power winch ensure tension on the cable is taken by element of the cable designed for that purpose, that is armour or conductor cores as appropriate and not plastic sheath, metal sheath or core insulation.
- When hand pulling cable ensure no kinks are formed and that flaking, when used, is done in the correct direction.
- Do not allow cable to twist during installation. Use swivels to connect pulling bond to cable stocking or equivalent fitting.
- Check drum is suitable for jacking before commencing installation. If drum or reel is unsuitable for jacking, flake cable in correct direction in maximum size turns from drum or reel before commencing installation. Use skilled labour to supervise all unreeling, flaking or running of cable from a drum.
- Lay cables in the formation shown, ensure spacing is not reduced below that indicated.
- Bind trefoil groups at 1m intervals. Bind any associated earth or protective conductor to its cable or trefoil group at 1m intervals.
- Space multiple cables in trenches in accordance with BS 7671.
- Ensure installation radii and permanent bending radii are not less than those recommended by the manufacturer.
- Do not lay cables to BS 7211 or BS EN 50525 direct in the ground.

4080 CABLE INSTALLATION INTO DUCTS:

- Install cables into newly proved and cleaned duct. Use lubricants, recommended by the cable manufacturer in writing, to assist drawing process.
- Flake cable if drums or reels are not suitable for jacking. At intermediate draw pits with exit duct more than 15° off line of entry duct, flake cable before entering or provide comprehensive system of corner plates, roller and blocks. Use maximum practical size of turns when flaking and ensure direction is correct.
- Do not exceed manufacturer's installation tension on cable and ensure the pulling tension is taken on cable elements designed for that purpose, that is armour or conductor cores and not on other elements, such as plastic sheath or conductor insulation.
- Do not allow cables being pulled into ducts to twist. Use appropriate swivel between pulling bond and cable stocking or similar appliance.
- Bind trefoil groups of single core cables installed into a single duct at 1m intervals. Install earth or

protective conductors into the same duct as the associated cable where practical, through manholes, draw pits and jointing chambers. Bind the two cables together. Pull all cables in one duct as a group. Ensure group does not twist or cross over. Report any damage to cable sheath during installation and carry out any instructed work to remedy the damage.

- Seal between cable and duct ends after cable installation. Ensure cable ends in jointing chambers are temporarily sealed where required.

4090A CABLE INSTALLATION IN CONDUIT AND TRUNKING:

- Install cables so that they are orderly and capable of being withdrawn.
- Arrange single core wiring generally using the loop-in method.
- Trunking
  - In vertical trunking provide pin racks at 3m intervals. Use ties at 2m intervals for all wires of the same circuit reference. Mark ties with circuit reference number at 10m intervals.
- Conduit
  - Provide cable clamps in conduit boxes at 10m intervals in vertical conduit.
  - Allow for full range of movement at building construction movement joints. Make all joints to wiring at terminal blocks in conduit boxes.
- Ensure wiring systems are supported so that they are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).

4100 CABLE INSTALLATION ON TRAY AND RACK:

- Place cables side by side or as indicated. Fix using cleats or cable ties so that any cable may be individually removed. Use metallic ties on cables with specified fire performance.
- Ensure that any cables not sitting on the top surface of the tray or rack are secured so that they are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).

4110A CABLE SURFACE INSTALLATION:

- Dress cables flat, free from twists, kinks and strain; and align parallel to building elements. When glands and clamps are not required, take sheathing of cables into accessory boxes and equipment and protect against abrasion using grommets or similar sharp edge protection.
- Ensure wiring systems are supported so that they are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).

4120A CABLE EMBEDDED INSTALLATION:

- Dress cables flat, free from twists, kinks and strain; and align parallel to building elements. When glands and clamps are not required, take sheathing of cables into accessory boxes and equipment and protect against abrasion using grommets or similar sharp edge protection.
- Ensure plaster or screed over cable is a minimum of 12mm. Protect embedded cables with metal capping or PVC oval conduit.

4130A CABLE INSTALLATION - MINERAL INSULATED CABLES:

- Straighten and dress cables using methods and tools recommended by cable manufacturer.
- Use thermoplastic or LSF sheathed cables in location indicated, and where cables may come into direct contact with any material that may be corrosive to copper.
- Do not allow extra length on installed cables to allow for cutting back of moisture affected ends. Store mineral insulated cables in the form as supplied by manufacturer.
- Ensure wiring systems are supported so that they are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).

4140 CABLE INSTALLATION - FLEXIBLE CORDS:

• Grip cords securely at connections. Where they do not form an integral part of the connected accessory or equipment, provide separate proprietary cord grips.

4150A CABLE JOINTING AND TERMINATING GENERALLY:

• Ensure all joints and terminations are made by appropriately qualified cable jointers, using jointing materials, components and workmanship recommended by the cable manufacturer and the jointing accessory manufacturer. Install cable glands in accordance with BS 6121-5

  • Cold pour resin and heat shrink joints.

  • Cut all cable ends immediately prior to jointing or terminating. Seal cables left unconnected for more than 24 hours to prevent the ingress of moisture. Seal plastic sheathed cables using proprietary shrink on end caps. Seal lead sheathed cables by a plumbed dressed lead cap with an airspace to allow conductor movement.

• Strip cables to bring out the cores and expose conductors, for the minimum length required for connection, to leave no exposed length of conductor after termination. Ensure that strands are not damaged when stripping cable cores. Twist strands together. Do not reduce number of strands. Secure all strands at terminations.

• Clean armour thoroughly prior to jointing or terminating.

• At connections to equipment and switchgear without integral cable clamping terminals, use compression or solder type lugs for bolted terminal connections, of correct bore.

• Form all compression connections to components using tools that cannot be released unless the correct degree of compression has been achieved.

  • Install and inspect compression and mechanical connectors on conductors in accordance with BS EN 60228 and BS 7609

• Bolt core terminations with lugs to equipment using washers or proprietary shakeproof devices.

• Do not bunch more than three cores at clamping terminals or bolted connections.

• Mark cable conductor phasing or other core identification at each end of all cables; and at all joints maintaining consistency of marking with any existing system.

• Connect all cores, including multicore cable spare cores, at all joints and terminations. Bond any unused cores or multicore cables to earth at both ends, unless otherwise indicated.

4170 CABLE JOINTING AND TERMINATING - ELASTOMER AND PLASTIC INSULATED CABLES:

• Joint cables using glands of the type indicated, in accordance with the manufacturer's instructions.

• Use shrouds at all glands, unless otherwise instructed.

• At core connections to equipment without integral clamping terminals use compression lugs unless otherwise indicated.

4180A TERMINATING - MINERAL INSULATED CABLES:

• Use terminations in accordance with BS EN 60702-2 and components and materials recommended or supplied by cable manufacturer.

• Use seals with maximum temperature rating indicated stub caps to the largest size available; and drilled caps and headed sleeves for larger sizes.

• Use glands of type indicated. At terminations to accessory boxes within a plaster or render finish, cable clamps fixed to accessory box and firmly gripping cable sheath may be used. Use earth tail seals with sheath grip type accessory boxes.

• At equipment not provided with threaded entries secure glands using lock washers and locknuts or brass conduit bush. Use gland shrouds when plastic covered MI cables are used.

• Using PVC, PIB or LSF material tape to BS EN 60454 to match sheath, tape overall gland any bare copper sheath and form seal to cable sheath under all shrouds.

• Mark core sleeving with appropriate identification.

• Install voltage surge suppressors in accordance with manufacturer's recommendations and surge suppressors to BS 7671, Section 331-01-01.

4190A CABLE JOINTS - MINERAL INSULATED CABLES:

• Joint mineral insulated cables using methods and materials recommended by cable manufacturer. Terminate cables in externally threaded glands using seals with temperature rating indicated. Join

conductors using crimped connectors.
- Insulate connectors using PVC tape to BS EN 60454, ensuring good seal to conductor sleeving. Make off glands into either end of internally threaded brass sleeve of correct size. Protect brass sleeve using heat shrink sleeve.

4200A COMMUNICATIONS COAXIAL, OPTICAL FIBRE AND IT CABLE INSTALLATION, JOINTING AND TERMINATING:
- Use methods approved by cable and accessory manufacturers.
- Use methods of fixing and restraint which do not deform the cross-section of cables, which might otherwise affect the data / signal performance of cables.
- Ensure cable protection mats are used in basket in which unarmoured copper cables are installed, where cable deformation may affect signal / data performance (e.g. Category 6 and Category 6a applications).
- Employ labour certified by acceptable body as qualified to install and make joints and terminations in the referenced cable. Obtain in writing approval of cable manufacturer for accessories not supplied by them.
- Identify cables using structured numbering scheme.
- Install communication, coaxial, optical fibre and IT cables in accordance with BS EN 50174-2 and BS EN 50174-3.
- Ensure wiring systems are supported so that they are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).
- Ensure that any cables not sitting on the top surface of a cable rack or tray are secured so that they are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).

BS APPENDIX

BS 3G 210:1996
Specification for PTFE insulated equipment wires and cables, single- and multi-core, with silver plated copper conductors (190°C) or nickel plated copper conductors (260°C)

BS 65:1991
Specification for vitrified clay pipes, fittings and ducts, also flexible mechanical joints for use solely with surface water pipes and fittings

BS 419:1966
Specification for varnished fabrics and tapes for electrical purposes

BS 3506:1969
Specification for unplasticized PVC pipe for industrial uses

BS 4553-1:1998
Specification for 600/1000 V single-phase split concentric electric cables. Part 1 Cables having PVC insulation

BS 4553-2:1998
Specification for 600/1000 V single-phase split concentric electric cables. Part 2 Cables having thermosetting insulation

BS 4553-3:1998
Specification for 600/1000 V single-phase split concentric electric cables. Part 3 Cables having thermosetting insulation and low emission of smoke and corrosive gases when affected by fire

BS 4660:2000
Thermoplastics ancillary fittings of nominal sizes 110 and 160 for below ground gravity drainage and sewerage.

BS 4737-3.30:2015
Intruder alarm systems. Part 3.30 Specifications for components. Specification for PVC insulated cables for interconnecting wiring

BS 5266-1:2016
Emergency lighting. Part 1: Code of practice for the emergency lighting of premises

BS 5467:2016
Electric cables. Thermosetting insulated, armoured cables of rated voltages of 600/1000 V and 1900/3300 V for fixed installations. Specification

BS 5733:2010+A1:2014
General requirements for electrical accessories. Specification

BS 5839-1:2017
Fire detection and fire alarm systems for buildings. Part 1 Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises

BS 5911-1:2002+A2:2010
Concrete pipes and ancillary concrete products. Part 1 Specification for unreinforced and reinforced concrete pipes (including jacking pipes) and fittings with flexible joints (complementary to BS EN 1916:2002)

BS 6004:2012
Electric cables. PVC insulated and PVC sheathed cables for voltages up to and including 300/500 V, for electric power and lighting

BS 6121-1:2005
Mechanical cable glands. Part 1 Armour glands. Requirements and test methods

BS 6121-5:2005
Mechanical cable glands. Part 5 Code of practice for selection, installation and inspection of cable glands and armour glands

BS 6231:2006
Electric cables. Single core PVC insulated flexible cables of rated voltage 600/1000V for switchgear and controlgear wiring.

BS 6387:2013
Test method for resistance to fire of cables required to maintain circuit integrity under fire conditions

BS 6469-99-1:1992
Insulating and sheathing materials of electric cables. Test methods used in the United Kingdom but not

specified in BS EN 60811. Non-electrical tests

BS 6469-99.2:1992
Insulating and sheathing materials of electric cables. Test methods used in the United Kingdom but not specified in BS EN 60811. Electrical tests

BS 6622:2007
Electric cables. Armoured cables with thermosetting insulation for rated voltages from 3.8/6.6 kV to 19/33 kV. Requirements and test methods.

BS 6701:2016+A1:2017
Telecommunications equipment and telecommunications cabling. Specification for installation, operation and maintenance

BS 6708:1998
Flexible cables for use at mines and quarries

BS 6724:2016
Electric cables. Thermosetting insulated, armoured cables of rated voltages of 600/1000 V and 1900/3300 V for fixed installations, having low emission of smoke and corrosive gases when affected by fire. Specification

BS 6883:1999
Elastomer insulated cables for fixed wiring in ships and on mobile and fixed offshore units. Requirements and test methods

BS 7197:1990
Specification for performance of bonds for electric power cable terminations and joints for system voltages up to 36 kV

BS 7211:2012
Electric cables. Thermosetting insulated and thermoplastic sheathed cables for voltages up to and including 450/750 V, for electric power and lighting and having low emission of smoke and corrosive gases when affected by fire

BS 7609:1992+A2:2009
Code of practice for installation and inspection of uninsulated compression and mechanical connectors for power cables with copper or aluminium conductors

BS 7629-1:2015
Electric cables. Specification for 300/500 V fire resistant, screened, fixed installation cables having low emission of smoke and corrosive gases when affected by fire. Part 1 Multicore cables

BS 7629-1:2015
Electric cables. Specification for 300/500 V fire resistant, screened, fixed installation cables having low emission of smoke and corrosive gases when affected by fire. Part 1 Multicore cables

BS 7655-0:2006
Specification for insulating and sheathing materials for cables. Part 0 General introduction

BS 7655-1.2:1997
Specification for insulating and sheathing materials for cables. Cross-linked elastomeric insulating compounds. General 90°C application

BS 7655-1.3:2000
Specification for insulating and sheathing materials for cables. Elastomeric insulating compounds. XLPE. Sec1.3 XLPE

BS 7655-1.5:2000
Specification for insulating and sheathing materials for cables. Cross-linked elastomeric insulating compounds. Flame retardant composites

BS 7655-2.3:2000
Specification for insulating and sheathing materials for cables. Elastomeric sheathing compounds. General application. General application

BS 7655-2.6:2000
Specification for insulating and sheathing materials for cables. Cross-linked elastomeric sheathing compounds. Sheathing compounds for ships' wiring and offshore applications

BS 7655-3.2:2000
Specification for insulating and sheathing materials for cables. PVC insulating compounds. Hard grade types. Hard grade types

BS 7655-4.2:2000
Specification for insulating and sheathing materials for cables. PVC sheathing compounds. General application. General application

BS 7655-6.1:1997
Specification for insulating and sheathing materials for cables. Part 6.1 Thermoplastic sheathing compounds having low emission of corrosive gases, and suitable for use in cables having low emission of smoke when affected by fire. General application thermoplastic types

BS 7655-10.1:2000
Specification for insulating and sheathing materials for cables. Polyethylene sheathing compounds. Thermoplastic medium density polyethylene (MDPE) sheathing compound

BS 7671:2018
Requirements for electrical installations. IET Wiring Regulations

BS 7835:2007
Electric cables. Armoured cables with thermosetting insulation for rated voltages from 3.8/6.6kV to 19/33 kV having low emission of smoke and corrosive gases when affected by fire. Requirements and test methods

BS 7846:2015
Electric cables. Thermosetting insulated, armoured, fire-resistant cables of rated voltage 600/1000 V for fixed installations, having low emission of smoke and corrosive gases when affected by fire. Specification

BS 7870-1:2011
LV and MV polymeric insulated cables for use by distribution and generation utilities. General

BS 7870-2:2011
LV and MV polymeric insulated cables for use by distribution and generation utilities. Methods of test

BS 7870-3.10:2001
LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for distribution cables of rated voltage 0.6/1 kV. PVC insulated combined neutral and earth copper wire concentric cables with copper or aluminium conductors

BS 7870-3.11:2011
LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for distribution cables of rated voltage 0.6/1 kV. XLPE insulated combined neutral and earth copper wire concentric cables with copper or aluminium conductors

BS 7870-3.12:2011
LV and MV polymeric insulated cables for use by distribution and generation utilities. Part 3.12 Specification for distribution cables of rated voltage 0.6/1 kV. XLPE insulated combined neutral and earth copper wire concentric cables with copper or aluminium conductors, having low emission of smoke and corrosive gases when affected by fire

BS 7870-3.20:2001
LV and MV polymeric insulated cables for use by distribution and generation utilities. Part 3.20 Specification for distribution cables of rated voltage 0.6/1 kV. PVC insulated split concentric cables with copper or aluminium conductors

BS 7870-3.21:2011
LV and MV polymeric insulated cables for use by distribution and generation utilities. Part 3.21 Specification for distribution cables of rated voltage 0.6/1 kV. XLPE insulated split concentric cables with copper or aluminium conductors

BS 7870-3.22:2011
LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for distribution cables of rated voltage 0.6/1 kV. XLPE insulated split concentric cables with copper or aluminium conductors, having low emission of smoke and corrosive gases when affected by fire

BS 7870-3.40:2011
LV and MV polymeric insulated cables for use by distribution and generation utilities. Part 3.40 Specification for distribution cables of rated voltage 0.6/1 kV. XLPE insulated, copper wire waveform concentric cables with solid aluminium conductors

BS 7870-3.50:2011
LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for distribution cables of rated voltage 0.6/1 kV. Part 3.50 XLPE insulated, copper wire waveform or helical concentric cables with solid aluminium conductors, having low emission of smoke and corrosive gases when affected by fire

BS 7870-4.10:2011+A1:2016

LV and MV polymeric insulated cables for use by distribution and generation utilities. Part 4.10 Specification for distribution cables with extruded insulation for rated voltages of 11 kV and 33 kV. Single-core 11 kV and 33 kV cables (Implementation of HD 620)

BS 7870-4.11:2011+A1:2016
LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for distribution cables with extruded insulation for rated voltages of 11 kV and 33 kV. Single-core 33 kV lead sheathed cables (Implementation of HD 620)

BS 7870-4.20:2011+A1:2016
LV and MV polymeric insulated cables for use by distribution and generation utilities. Part 4.20 Specification for distribution cables with extruded insulation for rated voltages of 11 kV and 33 kV. Three-core 11 kV cables (Implementation of HD 620)

BS 7870-5:2011
LV and MV polymeric insulated cables for use by distribution and generation utilities. Polymeric insulated aerial bundled conductors (ABC) of rated voltage 0.6/1 kV for overhead distribution

BS 7870-8.1:2003
LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for multicore and multipair cables for installation above and below ground. Single wire armoured and PVC sheathed multicore cable with copper conductors. Section 8.1 Single wire armoured and PVC sheathed multicore cable with copper conductors

BS 7870-8.2:2003
LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for multicore and multipair cables for installation above and below ground. Single wire armoured and PVC sheathed multipair cable with copper conductors. Section 8.2 Single wire armoured and PVC sheathed multipair cable with copper conductors

BS 7870-8.3:2003
LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for multicore and multipair cables for installation above and below ground. Single wire armoured and PVC sheathed multicore cable with copper conductors, having reduced fire propagation performance. Section 8.3 Single wire armoured and PVC sheathed multicore cable with copper conductors, having reduced fire propagation performance

BS 7870-8.4:2003
LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for multicore and multipair cables for installation above and below ground. Single wire or double steel tape armoured and PVC sheathed multipair cable with copper conductors, having reduced fire propagation performance. Section 8.4 Single wire or double steel tape armoured and PVC sheathed multipair cable with copper conductors, having reduced fire propagation performance

BS 7870-8.5:2003
LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for multicore and multipair cables for installation above and below ground. Single wire armoured and unarmoured multicore cables with copper conductors and non-halogenated sheath. Section 8.5 Single wire armoured and unarmoured multicore cables with copper conductors and non-halogenated sheath

BS 7870-8.6:2003
LV and MV polymeric insulated cables for use by distribution and generation utilities. Specification for

multicore and multipair cables for installation above and below ground. Single wire or double steel tape armoured and non-halogenated sheathed multipair cable with copper conductors. Section 8.6 Single wire or double steel tape armoured and non-halogenated sheathed multipair cable with copper conductors

BS 7888-4.1:2006+A1:2008
Test requirements on accessories for use on power cables of rated voltage from 3,6/6(7,2)kV up to 20,8/36(42)kV. Part 4.1 Cables with extruded insulation

BS 7888-4.2:2006+A1:2008
Test requirements on accessories for use on power cables of rated voltage from 3,6/6(7,2) kV up to 20,8/36(42) kV. Cables with impregnated paper insulation

BS 7889:2012
Electric cables. Thermosetting insulated, non-armoured cables with a voltage of 600/1000 V, for fixed installations

BS 8436:2011
Electric cables. Specification for 300/500 V screened electric cables having low emission of smoke and corrosive gases when affected by fire, for use in walls, partitions and building voids. Multicore cables

BS 8488:2009+A1:2010
Prefabricated wiring systems intended for permanent connection in fixed installations. Specification

BS 8512:2008
Electric cables. Code of practice for the storage, handling, installation and disposal of cables on wooden drums

BS 8519:2010
Selection and installation of fire-resistant power and control cable systems for life safety and fire-fighting applications. Code of practice

BS 8592:2016
Electric cables. Thermosetting insulated, non-armoured, fire-resistant, single core non-sheathed cables of rated voltage 450/750 V, having low emission of smoke and corrosive gases when affected by fire. Specification

BS CECC 42200:1988
Harmonized system of quality assessment for electronic components. Sectional specification: surge suppression varistors

BS EN 1401-1:2009
Plastics piping systems for non-pressure underground drainage and sewerage. Unplasticized poly(vinyl chloride) (PVC-U). Part 1 Specifications for pipes, fittings and the system

BS EN 1916:2002
Concrete pipes and fittings, unreinforced, steel fibre and reinforced.

BS EN 10255:2004
Non-alloy steel tubes suitable for welding and threading. Technical delivery conditions

BS EN 10257-1:2011
Zinc or zinc alloy coated non-alloy steel wire for armouring either power cables or telecommunication cables. Land cables

BS EN 12201-1:2011
Plastic piping systems for water supply, and for drainage and sewerage under pressure. Polyethylene (PE). Part 1 General

BS EN 12201-2:2011+A1:2013
Plastic piping systems for water supply, and for drainage and sewerage under pressure. Polyethylene (PE). Part 2 Pipes

BS EN 12201-3:2011+A1:2012
Plastic piping systems for water supply, and for drainage and sewerage under pressure. Part 3 Polyethylene (PE) Fittings

BS EN 12201-4:2012
Plastic piping systems for water supply, and for drainage and sewerage under pressure. Part 4 Polyethylene (PE). Valves

BS EN 12201-5:2011
Plastic piping systems for water supply, and for drainage and sewerage under pressure. Part 5 Polyethylene (PE). Fitness for purpose of the system

BS EN 12548:1999
Lead and alloys. Lead alloy ingots for electric cable sheathing and for sleeves

BS EN 13501-6:2014
Fire classification of construction products and building elements. Classification using data from reaction to fire tests on electric cables

BS EN 13603:2013
Copper and copper alloys. Test methods for assessing protective tin coatings on drawn round copper wire for electrical purposes

BS EN 50090-9-1:2004
Home and building electronic systems (HBES). Part 9-1 Installation requirements. Generic cabling for HBES class 1 twisted pair

BS EN 50098-1:1999
Customer premises cabling for information technology. ISDN basic access

BS EN 50117-1:2002+A2:2013
Coaxial cables. Generic specification

BS EN 50117-2-1:2005+A2:2013
Coaxial cables. Part 2-1 Sectional specification for cables used in cabled distribution networks. Indoor

drop cables for systems operating at 5 MHz - 1000 MHz

BS EN 50117-2-2:2004+A2:2013
Coaxial cables. Part 2-2 Sectional specification for cables used in cabled distribution networks. Outdoor drop cables for systems operating at 5 MHz - 1000 MHz

BS EN 50117-2-3:2004+A2:2013
Coaxial cables. Part 2-3 Sectional specification for cables used in cabled distribution networks. Distribution and trunk cables for systems operating at 5 MHz - 1000 MHz

BS EN 50117-2-4:2004+A2:2013
Coaxial cables. Part 2-4 Sectional specification for cables used in cabled distribution networks. Indoor drop cables for systems operating at 5 MHz - 3000 MHz

BS EN 50117-2-5:2004+A2:2013
Coaxial cables. Part 2-5 Sectional specification for cables used in cabled distribution networks. Outdoor drop cables for systems operating at 5 MHz - 3000 MHz

BS EN 50117-3-1:2002
Coaxial cables. Part 3-1 Sectional specifications for cables used in telecom applications. Miniaturized cables used in digital communication systems

BS EN 50117-3:1996
Coaxial cables used in cabled distribution networks. Part 3 Sectional specification for outdoor drop cables

BS EN 50117-4-1:2008+A1:2013
Coaxial cables. Sectional specification for cables for BCT cabling in accordance with EN 50173. Indoor drop cables for systems operating at 5 MHz - 3 000 MHz

BS EN 50117-4-2:2015
Coaxial cables. Sectional specification for CATV cables up to 6 GHz used in cabled distribution networks

BS EN 50117-4:1996
Coaxial cables used in cabled distribution networks. Part 4 Sectional specification for distribution and trunk cables

BS EN 50117-5:1997
Coaxial cables used in cabled distribution networks. Part 5 Sectional specification for indoor drop cables for use in networks operating at frequencies between 5 MHz and 2150 MHz

BS EN 50117-6:1997
Coaxial cables used in cabled distribution networks. Part 6 Sectional specification for outdoor drop cables for use in networks operating at frequencies between 5 MHz and 2150 MHz

BS EN 50143:2009
Cables for signs and luminous-discharge-tube installations operating from a no-load rated output voltage exceeding 1000 V but not exceeding 10000 V

BS EN 50173-1:2018
Information technology. Generic cabling systems. Part 1 General requirements

BS EN 50173-2:2018
nformation technology. Generic cabling systems. Part 2: Office spaces

BS EN 50173-3:2018
nformation technology. Generic cabling systems. Part 3: Industrial spaces

BS EN 50173-4:2018
nformation technology. Generic cabling systems. Part 4 Homes

BS EN 50173-5:2018
nformation technology. Generic cabling systems. Part 5 Data centre spaces

BS EN 50173-6:2018
Information technology. Generic cabling systems. Distributed building services

BS EN 50174-1:2018
Information technology. Cabling installation. Installation specification and quality assurance

BS EN 50174-2:2018
Information technology. Cabling installation. Installation planning and practices inside buildings

BS EN 50174-2:2018
Information technology. Cabling installation. Installation planning and practices inside buildings

BS EN 50174-3:2013+A1:2017
Information technology. Cabling installation. Part 3 Installation planning and practices outside buildings

BS EN 50174-3:2013+A1:2017
Information technology. Cabling installation. Part 3 Installation planning and practices outside buildings

BS EN 50200:2015
Method of test for resistance to fire of unprotected small cables for use in emergency circuits

BS EN 50214:2006
Flat polyvinyl chloride sheathed flexible cables

BS EN 50288-1:2013
Multi-element metallic cables used in analogue and digital communication and control. Part 1 Generic specification

BS EN 50288-1:2013
Multi-element metallic cables used in analogue and digital communication and control. Part 1 Generic specification

BS EN 50288-2-1:2013
Multi-element metallic cables used in analogue and digital communication and control. Part 2-1 Sectional specification for screened cables characterized up to 100 MHz. Horizontal and building backbone cables

BS EN 50288-2-1:2013
Multi-element metallic cables used in analogue and digital communication and control. Part 2-1 Sectional specification for screened cables characterized up to 100 MHz. Horizontal and building backbone cables

BS EN 50288-2-2:2013
Multi-element metallic cables used in analogue and digital communication and control. Part 2-2 Sectional specification for screened cables characterised up to 100 MHz. Work area and patch cord cables

BS EN 50288-2-2:2013
Multi-element metallic cables used in analogue and digital communication and control. Part 2-2 Sectional specification for screened cables characterised up to 100 MHz. Work area and patch cord cables

BS EN 50288-3-1:2013
Multi-element metallic cables used in analogue and digital communication and control. Part 3-1 Sectional specification for unscreened cables characterized up to 100 MHz. Horizontal and building backbone cables

BS EN 50288-3-1:2013
Multi-element metallic cables used in analogue and digital communication and control. Part 3-1 Sectional specification for unscreened cables characterized up to 100 MHz. Horizontal and building backbone cables

BS EN 50288-3-2:2013
Multi-element metallic cables used in analogue and digital communication and control. Part 3-2 Sectional specification for unscreened cables characterized up to 100 MHz. Work area and patch cord cables

BS EN 50288-3-2:2013
Multi-element metallic cables used in analogue and digital communication and control. Part 3-2 Sectional specification for unscreened cables characterized up to 100 MHz. Work area and patch cord cables

BS EN 50288-4-1:2013
Multi-element metallic cables used in analogue and digital communication and control. Part 4-1 Sectional specification for screened cables characterized up to 600 MHz. Horizontal and building backbone cables

BS EN 50288-4-1:2013
Multi-element metallic cables used in analogue and digital communication and control. Part 4-1 Sectional specification for screened cables characterized up to 600 MHz. Horizontal and building backbone cables

BS EN 50288-4-2:2013
Multi-element metallic cables used in analogue and digital communication and control. Part 4-2 Sectional specification for screened cables characterized up to 600 MHz. Work area and patch cord cables

BS EN 50288-4-2:2013
Multi-element metallic cables used in analogue and digital communication and control. Part 4-2 Sectional

specification for screened cables characterized up to 600 MHz. Work area and patch cord cables

BS EN 50288-5-1:2013
Multi-element metallic cables used in analogue and digital communication and control. Sectional specification for screened cables characterized up to 250 MHz. Part 5-1 Horizontal and building backbone cables

BS EN 50288-5-1:2013
Multi-element metallic cables used in analogue and digital communication and control. Sectional specification for screened cables characterized up to 250 MHz. Part 5-1 Horizontal and building backbone cables

BS EN 50288-5-2:2013
Multi-element metallic cables used in analogue and digital communication and control. Sectional specification for screened cables characterized up to 250 MHz. Part 5-2 Work area and patch cord cables

BS EN 50288-5-2:2013
Multi-element metallic cables used in analogue and digital communication and control. Sectional specification for screened cables characterized up to 250 MHz. Part 5-2 Work area and patch cord cables

BS EN 50288-6-1:2013
Multi-element metallic cables used in analogue and digital communication and control. Sectional specification for unscreened cables characterised up to 250 MHz. Part 6-1 Horizontal and building backbone cables

BS EN 50288-6-1:2013
Multi-element metallic cables used in analogue and digital communication and control. Sectional specification for unscreened cables characterised up to 250 MHz. Part 6-1 Horizontal and building backbone cables

BS EN 50288-6-2:2013
Multi-element metallic cables used in analogue and digital communication and control. Part 6-2 Sectional specification for unscreened cables characterised up to 250 MHz. Work area and patch cord cables

BS EN 50288-6-2:2013
Multi-element metallic cables used in analogue and digital communication and control. Part 6-2 Sectional specification for unscreened cables characterised up to 250 MHz. Work area and patch cord cables

BS EN 50288-7:2005
Multi-element metallic cables used in analogue and digital communication and control. Part 7 Sectional specification for instrumentation and control cables

BS EN 50288-7:2005
Multi-element metallic cables used in analogue and digital communication and control. Part 7 Sectional specification for instrumentation and control cables

BS EN 50288-8:2012
Multi-element metallic cables used in analogue and digital communication and control. Specification for

type 1 cables characterised up to 2 MHz

BS EN 50288-9-1:2012
Multi-element metallic cables used in analogue and digital communication and control. Sectional specification for screened cables characterised up to 1 000 MHz. Horizontal and building backbone cables

BS EN 50288-10-1:2012
Multi-element metallic cables used in analogue and digital communication and control. Sectional specification for screened cables characterized up to 500 MHz. Horizontal floor and building backbone cables

BS EN 50288-11-1:2012
Multi-element metallic cables used in analogue and digital communication and control. Sectional specification for un-screened cables characterised up to 500 MHz. Horizontal and building backbone cables

BS EN 50290-2-21:2002
Communication cables. Part 2-21 Common design rules and construction. PVC insulation compounds

BS EN 50290-2-22:2002
Communication cables. Part 2-22 Common design rules and construction. PVC sheathing compounds

BS EN 50290-2-23:2013
Communication cables. Part 2-23 Common design rules and construction. Polyethylene insulation for multi-pair cables used in access telecommunication networks: Outdoor cables

BS EN 50290-2-24:2002+A1:2008
Communication cables. Common design rules and construction. PE sheathing

BS EN 50290-2-25:2013
Communication cables. Part 2-25 Common design rules and construction. Polypropylene insulation compounds

BS EN 50290-2-26:2002
Communication cables. Part 2-26 Common design rules and construction. Halogen free flame retardant insulation compounds

BS EN 50290-2-27:2002+A1:2007
Communication cables. Common design rules and construction. Halogen free flame retardant thermoplastic sheathing compounds

BS EN 50290-2-28:2002
Communication cables. Part 2-28 Common design rules and construction. Filling compounds for filled cables

BS EN 50290-2-29:2002
Communication cables. Part 2-29 Common design rules and construction. Cross-linked PE insulation compounds

BS EN 50290-2-30:2002
Communication cables. Part 2-30 Common design rules and construction. Poly(tetrafluoroethylene-hexafluoropropylene) (FEP) insulation and sheathing

BS EN 50334:2001
Marking by inscription for the identification of cores of electric cables

BS EN 50363-0:2011
Insulating, sheathing and covering materials for low voltage energy cables. General introduction

BS EN 50363-1:2005
Insulating, sheathing and covering materials for low-voltage energy cables. Cross-linked elastomeric insulating compounds

BS EN 50363-2-1:2005+A1:2011
Insulating, sheathing and covering materials for low-voltage energy cables. Cross-linked elastomeric sheathing compounds

BS EN 50363-2-2:2005
Insulating, sheathing and covering materials for low voltage energy cables. Part 2-2 Cross-linked elastomeric covering compounds

BS EN 50363-3:2005+A1:2011
Insulating, sheathing and covering materials for low voltage energy cables. PVC insulating compounds

BS EN 50363-4-1:2005
Insulating, sheathing and covering materials for low voltage energy cables. Part 4-1 PVC sheathing compounds

BS EN 50363-4-2:2005
Insulating, sheathing and covering materials for low-voltage energy cables. PVC covering compounds

BS EN 50363-5:2005+A1:2011
Insulating, sheathing and covering materials for low voltage energy cables. Halogen-free, cross-linked insulating compounds

BS EN 50363-6:2005+A1:2011
Insulating, sheathing and covering materials for low-voltage energy cables. Halogen-free, cross-linked sheathing compounds

BS EN 50363-7:2005
Insulating, sheathing and covering materials for low voltage energy cables. 7 Halogen-free, thermoplastic insulating compounds

BS EN 50363-8:2005+A1:2011
Insulating, sheathing and covering materials for low voltage energy cables. Part 8 Halogen-free, thermoplastic sheathing compounds

BS EN 50363-9-1:2005
Insulating, sheathing and covering materials for low-voltage energy cables. Part 9-1 Miscellaneous insulating compounds. Cross-linked polyvinyl chloride (XLPVC)

BS EN 50363-10-1:2005
Insulating, sheathing and covering materials for low-voltage energy cables. Part 10-1 Miscellaneous sheathing compounds. Cross-linked polyvinyl chloride (XLPVC)

BS EN 50363-10-2:2005
Insulating, sheathing and covering materials for low-voltage energy cables. Part 10-2 Miscellaneous sheathing compounds. Thermoplastic polyurethane

BS EN 50377-2-1:2001
Connectors sets and interconnect components to be used in optical fibre communication systems. Part 2-1 Product specifications. Type FC-PC terminated on IEC 60793-2 category B1 singlemode fibre

BS EN 50377-2-2:2009
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. FC/APC 8 terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre, with full zirconia ferrule, category C

BS EN 50377-3-1:2008
Connectors sets and interconnect components to be used in optical fibre communication systems. Part 3-1 Product specifications. Type SG terminated on IEC 6 0793-2 category A1a and A1b or equivalent multimode fibre for category C

BS EN 50377-4-2:2011
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type SC/APC simplex 8° terminated on IEC 60793-2-50 of types B1.1 and B1.3 singlemode fibre, with full zirconia ferrule category U

BS EN 50377-4-4:2011
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type SC-PC simplex terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre, with full zirconia ferrule category U

BS EN 50377-5-1:2003
Connectors sets and interconnect components to be used in optical fibre communication systems. Part 5-1 Product specifications. Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type EC terminated on IEC 60793-2 category B.1.1 singlemode fibre

BS EN 50377-6-1:2002
Connectors sets and interconnect components to be used in optical fibre communication systems. Part 6-1 Product specifications. Type SC-RJ terminated on IE C 60793-2 category A1a and A1b multimode fibre

BS EN 50377-6-2:2007
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. SC-RJ single mode terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode

fibre, category U

BS EN 50377-7-1:2004
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type LC-PC duplex terminated on IEC 60793-2 category A1a and A1b multimode fibre

BS EN 50377-7-2:2004
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. LC-PC duplex terminated on IEC 60793-2 category B1.1 singlemode fibre

BS EN 50377-7-3:2004
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type LC-APC duplex terminated on IEC 60793-2 category B1.1 singlemode fibre

BS EN 50377-7-4:2011
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. LC-PC simplex terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre with full zirconia ferrule for category C

BS EN 50377-8-2:2007
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type LSH-APC simplex terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre, composite ferrule category C

BS EN 50377-8-3:2007
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. LSH-PC simplex terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre, composite ferrule category C

BS EN 50377-8-4:2007
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. LSH-APC simplex terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre, composite ferrule category U

BS EN 50377-8-5:2007
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. LSH-PC simplex terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre, composite ferrule category U

BS EN 50377-8-6:2007
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. LSH-HR simplex terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre, with full zirconia ferrule category C

BS EN 50377-8-7:2007
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. LSH-PC terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre, with full zirconia ferrule category C

BS EN 50377-8-8:2007

Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. LSH-APC simplex terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre, with full zirconia ferrule category U

BS EN 50377-8-9:2007
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. LSH-PC simplex terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre, with full zirconia ferrule category U

BS EN 50377-8-10:2010
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type LSH-APC simplex terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre with titanium composite ferrule for category C

BS EN 50377-8-11:2010
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type LSH-PC simplex terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre with titanium composite ferrule for category C

BS EN 50377-8-12:2010
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type LSH-APC simplex terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre with titanium composite ferrule for category U

BS EN 50377-8-13:2010
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type LSH-PC simplex terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre with titanium composite ferrule for category U

BS EN 50377-9-1:2003
Connectors sets and interconnect components to be used in optical fibre communication systems. Product specifications. Part 9-1 Type MT-RJ terminated on IEC 60793-2 category A1a and A1b multimode fibre

BS EN 50377-9-2:2004
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type MT-RJ terminated on IEC 60793-2 category B1.1 singlemode fibre

BS EN 50377-10-1:2007
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type MU-PC simplex terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre, with full zirconia ferrule category C

BS EN 50377-10-2:2005
Connectors sets and interconnect components to be used in optical fibre communication systems. Product specifications. MU/APC singlemode terminated on IEC 60793-2 category B1 fibre

BS EN 50377-11-1:2008
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type MF terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre for category C

BS EN 50377-13-2:2011
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type LX.5-PC DUPLEX terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre, with full zirconia ferrule category U

BS EN 50377-13-3:2011
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type LX.5-APC DUPLEX terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre, with full zirconia ferrule category U

BS EN 50377-14-1:2011
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Cords with IEC 60793-2-50 singlemode category B1.1 and B1.3 fibre for category C

BS EN 50377-15-1:2011
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type MPO with 12-fibre PPS ferrules terminated on IEC 60793-2 category A1a multimode fibre for 50/125 micron multimode fibre

BS EN 50377-16-1:2011
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type LF3 APC simplex terminated on IEC 60793-2-50 category B1.1 and B1.3 singlemode fibre with titanium composite ferrule for category C

BS EN 50377-17-1:2013
Connector sets and interconnect components to be used in optical fibre communication systems. Product specifications. Type FPFT (factory polished field terminated) simplex connector factory terminated with EN 60793-2-50 category B1.3 fibre and field mounted onto IEC 60793-2-50 category B1.3 or B6a_1 or B6a_2 singlemode fibre, category C

BS EN 50377-17-2:2015
Connector sets and Interconnect components to be used in optical fibre communication systems. Product specifications. Type FPFT (factory polished field terminated) simplex connector factory terminated with EN 60793-2-50 category B1.3 fibre and field mounted onto reinforced cable containing IEC 60793-2-50 category B1.3 or B6a1 or B6a 2 singlemode fibre (with restricted MFD), category C

BS EN 50393:2015
Test methods and requirements for accessories for use on distribution cables of rated voltage 0,6/1,0 (1,2) kV

BS EN 50407-3:2014
Multi-pair cables used in high bit rate digital access telecommunications networks. Indoor multi-pair/quad riser cables up to 100 MHz for maximum length of connection 100 m supporting universal services, xDSL and applications up to 100 Mbit/s over IP

BS EN 50441-1:2012
Cables for indoor residential telecommunication installations. Part 1 Unscreened cables. Grade 1

BS EN 50441-2:2012

Cables for indoor residential telecommunication installations. Part 2 Screened cables. Grade 1

BS EN 50441-3:2006
Cables for indoor residential telecommunication installations. Screened cables. Grade 3

BS EN 50441-4:2012
Cables for indoor residential telecommunication installations. Part 4 Cables up to 1200 MHz. Grade 3

BS EN 50525-1:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). General requirements

BS EN 50525-2-11:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750V (U0/U). Cables for general applications. Flexible cables with thermoplastic PVC insulation

BS EN 50525-2-12:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables for general applications. Cables with thermoplastic PVC insulation for extensible leads

BS EN 50525-2-21:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables for general applications. Flexible cables with crosslinked elastomeric insulation

BS EN 50525-2-22:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables for general applications. High flexibility braided cables with crosslinked elastomeric insulation

BS EN 50525-2-31:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables for general applications. Single core non-sheathed cables with thermoplastic PVC insulation

BS EN 50525-2-41:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables for general applications. Single core cables with crosslinked silicone rubber insulation

BS EN 50525-2-42:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables for general applications. Single core non-sheathed cables with crosslinked EVA insulation

BS EN 50525-2-51:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables for general applications. Oil resistant control cables with thermoplastic PVC insulation

BS EN 50525-2-71:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables for general applications. Flat tinsel cables (cords) with thermoplastic PVC insulation

BS EN 50525-2-72:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables for general applications. Flat divisible cables (cords) with thermoplastic PVC insulation

BS EN 50525-2-81:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables for general applications. Cables with crosslinked elastomeric covering for arc welding

BS EN 50525-2-82:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables for general applications. Cables with crosslinked elastomeric insulation for decorative chains

BS EN 50525-2-83:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables for general applications. Multicore cables with crosslinked silicone rubber insulation

BS EN 50525-3-11:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables with special fire performance. Flexible cables with halogen-free thermoplastic insulation, and low emission of smoke

BS EN 50525-3-21:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables with special fire performance. Flexible cables with halogen-free crosslinked insulation, and low emission of smoke

BS EN 50525-3-31:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables with special fire performance. Single core non-sheathed cables with halogen-free thermoplastic insulation, and low emission of smoke

BS EN 50525-3-41:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables with special fire performance. Single core non-sheathed cables with halogen-free crosslinked insulation, and low emission of smoke

BS EN 50565-1:2014
Electric cables. Guide to use for cables with a rated voltage not exceeding 450/750 V (U0/U). General guidance

BS EN 50565-2:2014
Electric cables. Guide to use for cables with a rated voltage not exceeding 450/750 V (U0/U). Specific guidance related to EN 50525 cable types

BS EN 50575:2014+A1:2016
Power, control and communication cables. Cables for general applications in construction works subject to reaction to fire requirements

BS EN 60079-1:2014
Explosive atmospheres. Equipment protection by flameproof enclosures "d"

BS EN 60079-2:2014
Explosive atmosphere. Equipment protection by pressurized enclosure "p"

BS EN 60079-5:2015
Explosive atmospheres. Equipment protection by powder filling "q"

BS EN 60079-6:2015
Explosive atmospheres. Equipment protection by liquid immersion “o”

BS EN 60079-10-1:2015
Explosive atmospheres. Part 10-1 Classification of areas. Explosive gas atmospheres

BS EN 60079-10-2:2015
Explosive atmospheres. Classification of areas. Explosive dust atmospheres

BS EN 60079-11:2012
Explosive atmospheres. Part 11 Equipment protection by intrinsic safety "i"

BS EN 60079-13:2017
Explosive atmospheres. Equipment protection by pressurized room "p"

BS EN 60079-14:2014
Explosive atmospheres. Electrical installations design, selection and erection

BS EN 60079-14:2014
Explosive atmospheres. Electrical installations design, selection and erection

BS EN 60079-15:2010
Explosive atmospheres. Part 15 Equipment protection by type of protection "n"

BS EN 60079-17:2014
Explosive atmospheres. Part 17 Electrical installations inspection and maintenance

BS EN 60079-18:2015+A1:2017
Explosive atmospheres. Equipment protection by encapsulation "m"

BS EN 60079-19:2011+A1:2015
Explosive atmospheres. Equipment repair, overhaul and reclamation

BS EN 60079-20-1:2010
Explosive atmospheres. Material characteristics for gas and vapour classification. Test methods and data

BS EN 60079-25:2010
Explosive atmospheres. Part 25 Intrinsically safe electrical systems

BS EN 60079-26:2015
Explosive atmospheres. Equipment with equipment protection level (EPL) Ga

BS EN 60079-27:2008
Explosive atmospheres. Fieldbus intrinsically safe concept (FISCO)

BS EN 60079-28:2015
Explosive atmospheres. Protection of equipment and transmission systems using optical radiation

BS EN 60079-29-1:2016
Explosive atmospheres. Gas detectors. Performance requirements of detectors for flammable gases

BS EN 60079-29-2:2015
Explosive atmospheres. Gas detectors. Selection, installation, use and maintenance of detectors for flammable gases and oxygen

BS EN 60079-29-3:2014
Explosive atmospheres. Gas detectors. Guidance on functional safety of fixed gas detection systems

BS EN 60079-29-4:2010
Explosive atmospheres. Gas detectors. Performance requirements of open path detectors for flammable gases

BS EN 60079-30-1:2017
Explosive atmospheres. Electrical resistance trace heating. General and testing requirements

BS EN 60079-30-2:2017
Explosive atmospheres. Part 30-2 Electric resistance trace heating. Application guide for design, installation and maintenance

BS EN 60079-31:2014
Explosive atmospheres. Equipment dust ignition protection by enclosure "t"

BS EN 60079-32-2:2015
Explosive atmospheres. Electrostatics hazards. Tests

BS EN 60079-35-1:2011
Explosive atmospheres. Caplights for use in mines susceptible to firedamp. General requirements. Construction and testing in relation to the risk of explosion

BS EN 60079-35-2:2012
Explosive atmospheres. Caplights for use in mines susceptible to firedamp. Performance and other safety-related matters

BS EN 60130-9:2011
Connectors for frequencies below 3 MHz. Part 9 Circular connectors for radio and associated sound equipment

BS EN 60228:2005
Conductors of insulated cables

BS EN 60332-1-1:2004+A1:2015
Tests on electric and optical fibre cables under fire conditions. Part 1-1 Test for vertical flame propagation for a single insulated wire or cable. Apparatus

BS EN 60332-1-2:2004+A11:2016
Tests on electric and optical fibre cables under fire conditions. Part 1-2 Test for vertical flame propagation for a single insulated wire or cable. Procedure for 1 kW pre-mixed flame

BS EN 60332-1-2:2004+A11:2016
Tests on electric and optical fibre cables under fire conditions. Part 1-2 Test for vertical flame propagation for a single insulated wire or cable. Procedure for 1 kW pre-mixed flame

BS EN 60332-1-3:2004+A1:2015
Tests on electric and optical fibre cables under fire conditions. Part 1-3 Test for vertical flame propagation for a single insulated wire or cable. Procedure for determination of flaming droplets/particles

BS EN 60332-2-1:2004
Tests on electric and optical fibre cables under fire conditions. Part 2-1 Tests for vertical flame propagation for a single small insulated wire or cable. Apparatus

BS EN 60332-2-2:2004
Tests on electric and optical fibre cables under fire conditions. Part 2-2 Tests for vertical flame propagation for a single small insulated wire or cable. Procedure for diffusion flame

BS EN 60332-3-10:2009
Tests on electric and optical fibre cables under fire conditions. Test for vertical flame spread of vertically-mounted bunched wires or cables. Apparatus

BS EN 60332-3-21:2009
Tests on electric and optical fibre cables under fire conditions. Test for vertical flame spread of vertically-mounted bunched wires or cables. Category A F/R

BS EN 60332-3-22:2009
Tests on electric and optical fibre cables under fire conditions. Test for vertical flame spread of vertically-mounted bunched wires or cables. Category A

BS EN 60332-3-23:2009
Tests on electric and optical fibre cables under fire conditions. Test for vertical flame spread of vertically-mounted bunched wires or cables. Category B

BS EN 60332-3-24:2009
Tests on electric and optical fibre cables under fire conditions. Test for vertical flame spread of vertically-mounted bunched wires or cables. Category C

BS EN 60332-3-25:2009
Tests on electric and optical fibre cables under fire conditions. Test for vertical flame spread of vertically-mounted bunched wires or cables. Category D

BS EN 60352-3:1995
Solderless connections. Part 3 Solderless accessible insulation displacement connections. General requirements, test methods and practical guidance

BS EN 60454-1:1995
Specifications for pressure-sensitive adhesive tapes for electrical purposes. Part 1 General requirements

BS EN 60454-2:2007
Pressure-sensitive adhesive tapes for electrical purposes. Methods of test

BS EN 60454-3-1:1998
Specifications for pressure-sensitive adhesive tapes for electrical purposes. Specifications for individual materials. PVC film tapes with pressure-sensitive adhesive

BS EN 60454-3-2:2006
Pressure-sensitive adhesive tapes for electrical purposes. Specifications for individual materials. Requirements for polyester film tapes with rubber thermosetting, rubber thermoplastic or acrylic crosslinked adhesives

BS EN 60454-3-4:2007
Pressure-sensitive adhesive tapes for electrical purposes. Specifications for individual materials. Cellulose paper, creped and non-creped, with rubber thermosetting adhesive

BS EN 60454-3-6:1998
Specifications for pressure-sensitive adhesive tapes for electrical purposes. Specifications for individual materials. Polycarbonate film tapes with acrylic thermoplastic adhesive

BS EN 60454-3-7:1998
Specifications for pressure-sensitive adhesive tapes for electrical purposes. Specifications for individual materials. Polyimide film tapes with pressure-sensitive adhesive

BS EN 60454-3-8:2006
Pressure-sensitive adhesive tapes for electrical purposes. Specifications for individual materials. Woven fabric tapes with pressure-sensitive adhesive based on glass, cellulose acetate alone or combined with viscose fibre

BS EN 60454-3-11:2007
Pressure-sensitive adhesive tapes for electrical purposes. Specifications for individual materials. Polyester film combinations with glass filament, creped cellulosic paper, polyester non-woven, epoxy and pressure-sensitive adhesives

BS EN 60454-3-12:2006
Pressure-sensitive adhesive tapes for electrical purposes. Specifications for individual materials. Requirements for polyethylene and polypropylene film tapes with pressure sensitive adhesive

BS EN 60454-3-14:2002
Specifications for pressure-sensitive adhesive tapes for electrical purposes. Specifications for individual materials. Polytetrafluoroethylene film tapes with pressure-sensitive adhesive. Sheet 14: Polytetrafluoroethylene film tapes with pressure-sensitive adhesive.

BS EN 60454-3-19:2003
Specifications for pressure-sensitive adhesive tapes for electrical purposes. Specifications for individual materials. Tapes made from various backing materials with pressure-sensitive adhesive on both sides. Sheet 19: Tapes made from various backing materials with pressure-sensitive adhesive on both sides

BS EN 60529:1992+A2:2013
Degrees of protection provided by enclosures (IP code)

BS EN 60684-1:2003
Flexible insulating sleeving. Part 1 Definitions and general requirements

BS EN 60684-2:2011
Flexible insulating sleeving. Methods of test

BS EN 60684-3-100 TO 105:2002
Specification for flexible insulating sleeving. Specification requirements for individual types of sleeving. Extruded PVC sleeving. Extruded PVC sleeving

BS EN 60684-3-116:2011
Flexible insulating sleeving. Specifications for individual types of sleeving. Sheets 116 and 117: Extruded polychloroprene, general purpose

BS EN 60684-3-121 TO 124:2001
Specification for flexible insulating sleeving. Specification requirements for individual types of sleeving. Specifications for individual types of sleeving. Extruded silicone sleeving

BS EN 60684-3-136:1998
Specification for flexible insulating sleeving. Specification requirements for individual types of sleeving. Extruded fluorosilicone sleeving. General purpose

BS EN 60684-3-145 TO 147:2001
Specification for flexible insulating sleeving. Specification requirements for individual types of sleeving. Extruded PTFE sleeving

BS EN 60684-3-151:1998
Specification for flexible insulating sleeving. Specification requirements for individual types of sleeving. Extruded PVC/nitrile rubber. General purpose

BS EN 60684-3-165:2004
Flexible insulating sleeving. Specifications for individual types of sleeving . Extruded Polyolefin, flame retarded, limited fire hazard sleeving

BS EN 60684-3-205:2011
Flexible insulating sleeving. Specifications for individual types of sleeving. Sheet 205: Heat-shrinkable

chlorinated polyolefin sleeving, flame retarded, nominal shrink ratio 1,7:1 and 2:1

BS EN 60684-3-209:2010
Flexible insulating sleeving. Specifications for individual types of sleeving. Heat-shrinkable polyolefin sleeving, general purpose, flame retarded

BS EN 60684-3-211:2007
Flexible insulating sleeving. Specifications for individual types of sleeving. Heat-shrinkable sleeving, semi-rigid polyolefin, shrink ratio 2:1

BS EN 60684-3-212:2006
Flexible insulating sleeving. Specifications for individual types of sleeving. Heat-shrinkable polyolefin sleevings

BS EN 60684-3-214:2014
Flexible insulating sleeving. Specifications for individual types of sleeving. Heat-shrinkable, polyolefin sleeving, not flame retarded, thick and medium wall

BS EN 60684-3-216:2005+A2:2014
Flexible insulating sleeving. Specifications for individual types of sleeving. Heat-shrinkable, flame-retarded, limited-fire hazard sleeving

BS EN 60684-3-228:2004
Flexible insulating sleeving. Specification requirements for individual types of sleeving. Heat-shrinkable, semi-rigid polyvinylidene fluoride sleeving, flame retarded, fluid resistant, shrink ratio 2:1

BS EN 60684-3-229:2003
Specification for flexible insulating sleeving. Specification requirements for individual types of sleeving. Heat-shrinkable semi-flexible, polyvinylidene fluoride sleeving, flame retarded, fluid resistant, shrink ratio 2:1

BS EN 60684-3-233:2006
Flexible insulating sleeving. Specifications for individual types of sleeving. Heat-shrinkable fluoroelastomer sleeving, flame retarded, fluid resistant, shrink ratio 2:1

BS EN 60684-3-240 TO 243:2002
Specification for flexible insulating sleeving. Specification requirements for individual types of sleeving. Heat-shrinkable PTFE sleeving

BS EN 60684-3-246:2007
Flexible insulating sleeving. Specifications for individual types of sleeving. Heat-shrinkable polyolefin sleeving, dual wall, not flame retarded

BS EN 60684-3-247:2011+A1:2017
Flexible insulating sleeving. Specifications for individual types of sleeving. Sheet 247: Heat- shrinkable polyolefin sleeving, dual wall, not flame retarded, thick and medium wall

BS EN 60684-3-248:2007
Flexible insulating sleeving. Specifications for individual types of sleeving . General purpose, heat-

shrinkable, dual wall polyolefin sleeving, flame retarded, shrink ratios 2:1, 3:1, 4:1

BS EN 60684-3-271:2011
Flexible insulating sleeving. Specifications for individual types of sleeving. Heat-shrinkable elastomer sleevings, flame retarded, fluid resistant, shrink ratio 2:1

BS EN 60684-3-280:2010+A1:2014
Flexible insulating sleeving. Specifications for individual types of sleeving. Heat-shrinkable, polyolefin sleeving, anti-tracking

BS EN 60684-3-281:2010
Flexible insulating sleeving. Specifications for individual types of sleeving. Heat-shrinkable, polyolefin sleeving, semiconductive

BS EN 60684-3-282:2010
Flexible insulating sleeving. Specifications for individual types of sleeving. Heat-shrinkable, polyolefin sleeving. Stress control

BS EN 60684-3-283:2011+A1:2014
Flexible insulating sleeving. Specifications for individual types of sleeving. Heat-shrinkable, polyolefin sleeving, for bus-bar insulation

BS EN 60684-3-284:2014
Flexible insulating sleeving. Specifications for individual types of sleeving. Heat-shrinkable, sleevings, for oil barrier applications

BS EN 60684-3-285:2014
Flexible insulating sleeving. Specifications for individual types of sleeving. Sheet 285: Heat-shrinkable polyolefin sleeving, for medium voltage joint insulation

BS EN 60684-3-300:2002
Specification for flexible insulating sleeving. Specification requirements for individual types of sleeving. Glass textile fibre sleeving, braided, uncoated

BS EN 60684-3-320:2002
Specification for flexible insulating sleeving. Specification requirements for individual types of sleeving. Polyethylene terephthalate textile sleeving, lightly impregnated

BS EN 60684-3-340 TO 342:2003
Specification for flexible insulating sleeving. Specification requirements for individual types of sleeving. Expandable braided polyethylene terephthalate textile sleeving

BS EN 60684-3-343 TO 345:2002
Specification for flexible insulating sleeving. Specification requirements for individual types of sleeving. Expandable braided ethylene chlorotrifluoroethylene (E-CTFE) textile sleeving, uncoated

BS EN 60684-3-400 TO 402:2002
Specification for flexible insulating sleeving. Specification requirements for individual types of sleeving. Glass textile sleeving with silicone elastomer coating

BS EN 60684-3-403 TO 405:2002
Specification for flexible insulating sleeving. Specification requirements for individual types of sleeving. Glass textile sleeving with acrylic based coating

BS EN 60684-3-406 TO 408:2003
Specification for flexible insulating sleeving. Specification requirements for individual types of sleeving. Glass textile sleeving with PVC coating

BS EN 60684-3-409:1999
Specification for flexible insulating sleeving. Specification requirements for individual types of sleeving. Glass textile sleeving with polyurethane (PUR)-based coating

BS EN 60684-3-420 TO 422:2002
Specification for flexible insulating sleeving. Specification requirements for individual types of sleeving. Polyethylene terephthalate textile sleeving with acrylic based coating

BS EN 60702-1:2002+A1:2015
Mineral insulated cables and their terminations with a rated voltage not exceeding 750 V. Cables

BS EN 60702-2:2002+A1:2015
Mineral insulated cables and their terminations with a rated voltage not exceeding 750 V. Terminations

BS EN 60708:2005
Low-frequency cables with polyolefin insulation and moisture barrier polyolefin sheath

BS EN 60754-1:2014
Test on gases evolved during combustion of materials from cables. Determination of the halogen acid gas content

BS EN 60754-2:2014
Test on gases evolved during combustion of materials from cables. Determination of acidity (by pH measurement) and conductivity

BS EN 60793-1-1:2017
Optical fibres. Part 1-1 Measurement methods and test procedures. General and guidance

BS EN 60793-1-20:2014
Optical fibres. Measurement methods and test procedures. Fibre geometry

BS EN 60793-1-21:2002
Optical fibres. Measurement methods and test procedures. Coating geometry. Section 21 Coating geometry

BS EN 60793-1-22:2002
Optical fibres. Measurement methods and test procedures. Length measurement. Section 22: Length measurement methods

BS EN 60793-1-30:2011
Optical fibres. Measurement methods and test procedures. Fibre proof test

BS EN 60793-1-31:2010
Optical fibres. Measurement methods and test procedures. Tensile strength

BS EN 60793-1-32:2010
Optical fibres. Measurement methods and test procedures. Coating strippability

BS EN 60793-1-33:2002
Optical fibres. Measurement methods and test procedures. Stress corrosion susceptibility. Section 33 Stress corrosion susceptibility

BS EN 60793-1-34:2006
Optical fibres. Measurement methods and test procedures. Fibre curl

BS EN 60793-1-40:2003
Optical fibres. Measurement methods and test procedures. Attenuation

BS EN 60793-1-41:2010
Optical fibres. Measurement methods and test procedures. Bandwidth

BS EN 60793-1-42:2013
Optical fibres. Measurement methods and test procedures. Chromatic dispersion

BS EN 60793-1-43:2015
Optical fibres. Measurement methods and test procedures. Numerical aperture measurement

BS EN 60793-1-44:2011
Optical fibres. Measurement methods and test procedures. Cut-off wavelength

BS EN 60793-1-45:2003
Optical fibres. Measurement methods and test procedures. Mode field diameter

BS EN 60793-1-46:2002
Optical fibres. Measurement methods and test procedures. Monitoring of changes in optical transmittance

BS EN 60793-1-47:2009
Optical fibres. Measurement methods and test procedures. Macrobending loss

BS EN 60793-1-48:2007
Optical fibres. Part 1-48 Measurement methods and test procedures. Polarization mode dispersion

BS EN 60793-1-49:2006
Optical fibres. Part 1-49 Measurement methods and test procedures. Differential mode delay

BS EN 60793-1-50:2015
Optical fibres. Measurement methods. Damp heat (steady state) tests

BS EN 60793-1-51:2014
Optical fibres. Measurement methods and test procedures. Dry heat (steady state) tests

BS EN 60793-1-52:2014
Optical fibres. Measurement methods and test procedures. Change of temperature tests

BS EN 60793-1-53:2014
Optical fibres. Measurement methods and test procedures. Water immersion tests

BS EN 60793-1-54:2013
Optical fibres. Measurement methods and test procedures. Gamma irradiation

BS EN 60793-2-10:2017
Optical fibres. Part 2-10 Product specification. Sectional specification for category A1 multimode fibres

BS EN 60793-2-20:2016
Optical fibres. Part 2-20 Product specifications. Sectional specification for category A2 multimode fibres

BS EN 60793-2-30:2015
Optical fibres. Product specifications. Sectional specification for category A3 multimode fibres

BS EN 60793-2-40:2016
Optical fibres. Part 2-40 Product specifications. Sectional specification for category A4 multimode fibres

BS EN 60793-2-60:2008
Optical fibres. Product specifications. Sectional specification for category C single-mode intraconnection fibres

BS EN 60793-2:2016
Optical fibres. Product specifications. General

BS EN 60794-2-10:2016
Optical fibre cables. Part 2-10 Indoor optical fibre cables. Family specification for simplex and duplex cables

BS EN 60794-2-11:2012
Optical fibre cables. Part 2-11 Indoor optical fibre cables. Detailed specification for simplex and duplex cables for use in premises cabling

BS EN 60794-2-20:2014
Optical fibre cables. Indoor cables. Family specification for multi-fibre optical cables

BS EN 60794-2-30:2008
Optical fibre cables. Part 2-30 Indoor cables. Family specification for optical fibre ribbon cables

BS EN 60794-3-10:2015
Optical fibre cables. Outdoor cables. Family specification for duct, directly buried or lashed aerial optical telecommunication cables

BS EN 60794-3-11:2010
Optical fibre cables. Part 3-11 Outdoor cables. Product specification for duct, directly buried and lashed aerial single-mode optical fibre telecommunication cables

BS EN 60794-3-20:2016
Optical fibre cables. Part 3-20 Outdoor cables. Family specification for optical self-supporting aerial telecommunication cables

BS EN 60794-3-30:2008
Optical fibres. Outdoor cables. Family specification for optical telecommunication cables for lakes, river crossings and coastal application

BS EN 60794-3:2015
Optical fibre cables. Part 3 Sectional specification. Outdoor cables

BS EN 60794-4:2003
Optical fibre cables. Sectional specification. Part 4 Aerial optical cables along electrical power lines

BS EN 60811-100:2012
Electrical and optical fibre cables. Test methods for non-metallic materials. Part 101 General

BS EN 60811-201:2012
Electric and optical fibre cables. Test methods for non-metallic materials. General tests. Measurement of insulation thickness

BS EN 60811-202:2012
Electric and optical fibre cables. Test methods for non-metallic materials. General tests. Measurement of thickness of non-metallic sheath

BS EN 60811-203:2012
Electric and optical fibre cables. Test methods for non-metallic materials. General tests. Measurement of overall dimensions

BS EN 60811-301:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Electrical tests. Measurement of the permittivity at 23°C of filling compounds

BS EN 60811-302:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Electrical tests. Measurement of the d.c. resistivity at 23°C and 100°C of filling compounds

BS EN 60811-401:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Miscellaneous tests. Thermal ageing methods. Ageing in an air oven

BS EN 60811-402:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Miscellaneous tests. Water absorption tests

BS EN 60811-403:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Miscellaneous tests. Ozone resistance test on cross-linked compounds

BS EN 60811-404:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Miscellaneous tests. Mineral oil immersion tests for sheaths

BS EN 60811-405:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Miscellaneous tests. Thermal stability test for PVC insulations and PVC sheaths

BS EN 60811-406:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Miscellaneous tests. Resistance to stress cracking of polyethylene and polypropylene compounds

BS EN 60811-407:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Miscellaneous tests. Measurement of mass increase of polyethylene and polypropylene compounds

BS EN 60811-408:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Miscellaneous tests. Long-term stability test of polyethylene and polypropylene compounds

BS EN 60811-409:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Miscellaneous tests. Loss of mass test for thermoplastic insulations and sheaths

BS EN 60811-410:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Miscellaneous tests. Test method for copper-catalyzed oxidative degradation of polyolefin insulated conductors

BS EN 60811-411:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Miscellaneous tests. Low-temperature brittleness of filling compounds

BS EN 60811-412:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Miscellaneous tests. Thermal ageing methods. Ageing in an air bomb

BS EN 60811-501:2012

Electric and optical fibre cables. Test methods for non-metallic materials. Mechanical tests. Tests for determining the mechanical properties of insulating and sheathing compounds

BS EN 60811-502:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Mechanical tests. Shrinkage test for insulations

BS EN 60811-503:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Mechanical tests. Shrinkage test for sheaths

BS EN 60811-504:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Mechanical tests. Bending tests at low temperature for insulation and sheaths

BS EN 60811-505:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Mechanical tests. Elongation at low temperature for insulations and sheaths

BS EN 60811-506:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Mechanical tests. Impact test at low temperature for insulations and sheaths

BS EN 60811-507:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Mechanical tests. Hot set test for cross-linked materials

BS EN 60811-508:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Mechanical tests. Pressure test at high temperature for insulation and sheaths

BS EN 60811-509:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Mechanical tests. Test for resistance of insulations and sheaths to cracking (heat shock test)

BS EN 60811-510:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Mechanical tests. Methods specific to polyethylene and polypropylene compounds. Wrapping test after thermal ageing in air

BS EN 60811-511:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Mechanical tests. Measurement of the melt flow index of polyethylene compounds

BS EN 60811-512:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Mechanical tests. Methods specific to polyethylene and polypropylene compounds. Tensile strength and elongation at break after conditioning at elevated temperature

BS EN 60811-513:2012

Electric and optical fibre cables. Test methods for non-metallic materials. Mechanical tests. Methods specific to polyethylene and polypropylene compounds. Wrapping test after conditioning

BS EN 60811-601:2012
Electric and optical fibre cables. Test methods for non-metallic materials . Physical tests. Measurement of the drop point of filling compounds

BS EN 60811-602:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Physical tests. Separation of oil in filling compounds

BS EN 60811-603:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Physical tests. Measurement of total acid number of filling compounds

BS EN 60811-604:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Physical tests. Measurement of absence of corrosive components in filling compounds

BS EN 60811-605:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Physical tests. Measurement of carbon black and/or mineral filler in polyethylene compounds

BS EN 60811-606:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Physical tests. Methods for determining the density

BS EN 60811-607:2012
Electric and optical fibre cables. Test methods for non-metallic materials. Physical tests. Test for the assessment of carbon black dispersion in polyethylene and polypropylene

BS EN 60874-1-1:2012
Fibre optic interconnecting devices and passive components. Connectors for optical fibres and cables. Blank detail specification

BS EN 60874-1:2012
Fibre optic interconnecting devices and passive components. Connectors for optical fibres and cables. Generic specification

BS EN 60874-17:1997
Connectors for optical fibres and cables. Sectional specification for fibre optic connector. Type F-05 (friction lock)

BS EN 60874-19:1997
Connectors for optical fibres and cables. Sectional specification for fibre optic connector. Type SC-D (Duplex)

BS EN 60998-2-4:2005
Connecting devices for low voltage circuits for household and similar purposes. Part 2-4 Particular

requirements for twist-on connecting devices

BS EN 60999-1:2000
Connecting devices. Electrical copper conductors. Safety requirements for screw-type and screwless-type clamping units. Part 1 General requirements and particular requirements for clamping units for conductors from 0,2 mm2 up to 35 mm2 (included)

BS EN 60999-2:2003
Connecting devices. Electrical copper conductors. Safety requirements for screw-type and screwless-type clamping units. Part 2 Particular requirements for clamping units for conductors above 35 mm2 up to 300 mm2 (included)

BS EN 61034-2:2005+A1:2013
Measurement of smoke density of cables burning under defined conditions. Part 2 Test procedure and requirements

BS EN 61073-1:2009
Fibre optic interconnecting devices and Passive components. Mechanical splices and fusion splice protectors for optical fibres and cables. Generic specification

BS EN 61138:2007
Cables for portable earthing and short-circuiting equipment

BS EN 61196-3-2:1998
Radio-frequency cables. Part 3-2 Specifications. Coaxial cables for digital communication in horizontal floor wiring. Detail specification for coaxial cables with solid dielectric for local area networks of 185m reach and up to 10 Mb/s

BS EN 61196-3-2:1998
Radio-frequency cables. Part 3-2 Specifications. Coaxial cables for digital communication in horizontal floor wiring. Detail specification for coaxial cables with solid dielectric for local area networks of 185m reach and up to 10 Mb/s

BS EN 61196-3-3:1998
Radio-frequency cables. Part 3-3 Specifications. Coaxial cables for digital communication in horizontal floor wiring. Detail specification for coaxial cables with foamed dielectric for local area networks of 185m reach and up to 10 Mb/s

BS EN 61196-3-3:1998
Radio-frequency cables. Part 3-3 Specifications. Coaxial cables for digital communication in horizontal floor wiring. Detail specification for coaxial cables with foamed dielectric for local area networks of 185m reach and up to 10 Mb/s

BS EN 61196-3:1999
Radio-frequency cables. Part 3 Specifications. Sectional specification for coaxial cables for local area networks

BS EN 61196-3:1999
Radio-frequency cables. Part 3 Specifications. Sectional specification for coaxial cables for local area networks

BS EN 61196-4:2004
Coaxial communication cables. Part 4 Sectional specification for radiating cables

BS EN 61196-4:2004
Coaxial communication cables. Part 4 Sectional specification for radiating cables

BS EN 61196-10-1:2014
Coaxial communication cables. Blank detail specification for semi-rigid cables with polytetrafluoroethylene (PTFE) dielectric

BS EN 61196-10:2016
Coaxial communication cables. Sectional specification for semi-rigid cables with polytetrafluoroethylene (PTFE) dielectric

BS EN 61196-10:2016
Coaxial communication cables. Sectional specification for semi-rigid cables with polytetrafluoroethylene (PTFE) dielectric

BS EN 61238-1:2003
Compression and mechanical connectors for power cables for rated voltages up to 36 kV (Um = 42 kV). Part 1 Test methods and requirements

BS EN 61300-1:2016
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. General and guidance

BS EN 61300-2-1:2009
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Vibration (sinusoidal)

BS EN 61300-2-2:2008
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Mating durability

BS EN 61300-2-4:1997
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Fibre/cable retention

BS EN 61300-2-5:2011
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Torsion

BS EN 61300-2-6:2011
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Tensile strength of coupling mechanism

BS EN 61300-2-7:2013

Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Bending moment

BS EN 61300-2-8:1997
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Bump

BS EN 61300-2-9:2017
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Shock

BS EN 61300-2-10:2012
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Crush resistance

BS EN 61300-2-11:2013
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Axial compression

BS EN 61300-2-12:2009
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Impact

BS EN 61300-2-13:1997
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Acceleration

BS EN 61300-2-14:2013
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. High optical power

BS EN 61300-2-15:2008
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Torque strength of coupling mechanism

BS EN 61300-2-17:2011
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Cold

BS EN 61300-2-18:2005
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Dry heat. High temperature endurance

BS EN 61300-2-19:2013
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Damp heat (steady state)

BS EN 61300-2-21:2010
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures.

Tests. Composite temperature/humidity cyclic test

BS EN 61300-2-22:2007
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Change of temperature

BS EN 61300-2-23:2011
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Sealing for non-pressurized closures of fibre optic devices

BS EN 61300-2-24:2010
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Screen testing of ceramic alignment split sleeve by stress application

BS EN 61300-2-26:2007
Fibre optic interconnecting devices and passive Components. Basic test and measurement procedures. Tests. Salt mist

BS EN 61300-2-27:1997
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Dust. Laminar flow

BS EN 61300-2-28:2013
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Industrial atmosphere (sulphur dioxide)

BS EN 61300-2-29:1997
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Tests. Low air pressure

BS EN 61300-2-30:1997
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Solar radiation

BS EN 61300-2-32:1997
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Water vapour permeation

BS EN 61300-2-33:2012
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Assembly and disassembly of fibre optic mechanical splices, fibre management systems and closures

BS EN 61300-2-34:2009
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Resistance to solvents and contaminating fluids of interconnecting components and closures

BS EN 61300-2-35:2014

Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Cable nutation

BS EN 61300-2-36:1997
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Flammability (fire hazard)

BS EN 61300-2-37:2016
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Cable bending for fibre optic closures

BS EN 61300-2-38:2006
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Sealing for pressurized fibre optic closures

BS EN 61300-2-39:1997
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Susceptibility to external magnetic fields

BS EN 61300-2-40:2001
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Screen testing of attenuation of single-mode tuned angled optical connectors. Section 40: Test method for screen testing of attenuation of single mode tuned angled optical fibre connectors

BS EN 61300-2-41:1998
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Screen testing of attenuation of single-mode tuned non-angled optical fibre connectors

BS EN 61300-2-42:2014
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Static side load for strain relief

BS EN 61300-2-43:2014
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Screen testing of return loss of single-mode PC optical fibre connectors

BS EN 61300-2-44:2013
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Flexing of the strain relief of fibre optic devices

BS EN 61300-2-45:1999
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Durability test by water immersion

BS EN 61300-2-46:2006
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Damp heat cyclic

BS EN 61300-2-47:2016
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Thermal shocks

BS EN 61300-2-48:2009
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Temperature-humidity cycling

BS EN 61300-2-49:2007
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Connector installation test

BS EN 61300-2-50:2007
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Fibre optic connector proof test with static load. Singlemode and multimode

BS EN 61300-2-51:2007
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Fibre optic connector test for transmission with applied tensile load. Singlemode and multimode

BS EN 61300-2-52:2013
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Bending test for cords

BS EN 61300-2-55:2017
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Tests. Strength of mounted adaptor

BS EN 61300-3-1:2005
Fire optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Visual examination

BS EN 61300-3-2:2009
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Polarization dependent loss in a single-mode fibre optic device

BS EN 61300-3-3:2009
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Active monitoring of changes in attenuation and return loss

BS EN 61300-3-4:2013
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Attenuation

BS EN 61300-3-6:2009
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Return loss

BS EN 61300-3-7:2012

Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Wavelength dependence of attenuation and return loss of single mode components

BS EN 61300-3-8:1997
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Ambient light susceptibility

BS EN 61300-3-9:1997
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Far-end crosstalk

BS EN 61300-3-10:2007
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Gauge retention force

BS EN 61300-3-11:1997
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Engagement and separation forces

BS EN 61300-3-13:1997
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Control stability of a fibre optic switch

BS EN 61300-3-14:2014
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Error and repeatability of the attenuation settings of a variable optical attenuator

BS EN 61300-3-18:2006
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Keying accuracy of an angled endface connector

BS EN 61300-3-19:1997
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Polarization dependence of return loss of a single-mode fibre optic component

BS EN 61300-3-20:2002
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Directivity of fibre optic branching devices

BS EN 61300-3-21:2015
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Switching time

BS EN 61300-3-22:2011
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Ferrule compression force

BS EN 61300-3-24:2007
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Keying accuracy of optical connectors for polarization maintaining fibre

BS EN 61300-3-25:2016
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Concentricity of the non-angled ferrules and non-angled ferrules with fibre installed

BS EN 61300-3-26:2002
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Measurement of the angular misalignment between fibre and ferrule axes

BS EN 61300-3-27:1997
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Measurement method for the hole location of a multiway connector plug. Section 27: Measurement method for the hole location of a multiway connector plug.

BS EN 61300-3-28:2012
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Transient loss

BS EN 61300-3-29:2014
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Spectral transfer characteristics of DWDM devices

BS EN 61300-3-30:2003
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Polish angle and fibre position on single ferrule multifibre connectors

BS EN 61300-3-31:2003
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Coupled power ratio measurement for fibre optic sources

BS EN 61300-3-32:2006
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Polarization mode dispersion measurement for passive optical components

BS EN 61300-3-33:2012
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Withdrawal force from a resilient alignment sleeve using gauge pins

BS EN 61300-3-34:2009
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Attenuation of random mated connectors

BS EN 61300-3-35:2015
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Visual inspection of fibre optic connectors and fibre-stub transceivers

BS EN 61300-3-36:2000
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Examinations and measurements. Measurement methods for the inside and outside diameters of fibre optic connector ferrules

BS EN 61300-3-37:2005
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Endface angle of angle- polished optical fibres

BS EN 61300-3-38:2012
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Group delay, chromatic dispersion and phase ripple

BS EN 61300-3-39:2012
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Physical contact (PC) optical connector reference plug selection for return loss measurements

BS EN 61300-3-40:1998
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Extinction ratio of a polarization maintaining (pm) fibre pigtailed connector

BS EN 61300-3-42:2008
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Attenuation of single mode alignment sleeves and or adaptors with resilient alignment sleeves

BS EN 61300-3-43:2009
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Mode transfer function measurement for fibre optic sources

BS EN 61300-3-45:2011
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Attenuation of random mated multi-fibre connectors

BS EN 61300-3-46:2011
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Measurement. Bore diameter for guide pin in MT ferrules

BS EN 61300-3-47:2014
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. End face geometry of PC/APC spherically polished ferrules using interferometry

BS EN 61300-3-48:2013

Fibre optic interconnect devices and passive components. Basic test and measurement procedures. Examinations and measurements. Spring compression force of the coupling sleeve for rectangular ferrule multi-fibre connectors

BS EN 61300-3-49:2013
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Guide pin retention force for rectangular ferrule multi-fibre connectors

BS EN 61300-3-50:2013
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Crosstalk for optical spatial switches

BS EN 61300-3-51:2014
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Pin gauge withdrawal force for rectangular ferrule multi-fibre connectors

BS EN 61300-3-52:2014
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Guide hole and alignment pin deformation constant, CD for 8 degree angled PC rectangular ferrule, single mode fibres

BS EN 61300-3-53:2015
Fibre optic interconnecting devices and passive components. Basic test and measurement procedures. Examinations and measurements. Encircled angular flux (EAF) measurement method based on two-dimensional far field data from step index multimode waveguide (including fibre)

BS EN 61439-1:2011
Low-voltage switchgear and controlgear assemblies. Part 1 General rules

BS EN 61439-2:2011
Low-voltage switchgear and controlgear assemblies. Power switchgear and controlgear assemblies

BS EN 61439-3:2012
Low-voltage switchgear and controlgear assemblies. Distribution boards intended to be operated by ordinary persons (DBO)

BS EN 61439-4:2013
Low-voltage switchgear and controlgear assemblies. Particular requirements for assemblies for construction sites (ACS)

BS EN 61439-5:2015
Low-voltage switchgear and controlgear assemblies. Assemblies for power distribution in public networks

BS EN 61439-6:2012
Low-voltage switchgear and controlgear assemblies. Busbar trunking systems (busways)

BS EN 61442:2005
Test methods for accessories for power cables with rated voltages from 6 kV (Um = 7,2 kV) up to 36 kV

(Um = 42 kV)

BS EN 61535:2009+A1:2013
Installation couplers intended for permanent connection in fixed installations

BS EN 61754-1:2013
Fibre optic interconnecting devices and passive components. Fibre optic connector interfaces. General and guidance

BS EN 61754-2:1997
Fibre optic connector interfaces. Part 2 Type BFOC/2,5 connector family

BS EN 61754-3:2002
Fibre optic connector interfaces. Part 3 Type LSA connector family

BS EN 61754-4-1:2003
Fibre optic connector interfaces. Type SC connector family. Simplified receptacle SC-PC connector interfaces

BS EN 61754-4:2013
Fibre optic interconnecting devices and passive components. Fibre optic connector interfaces. Type SC connector family

BS EN 61754-5:2005
Fibre optic connector interfaces. Type MT connector family

BS EN 61754-6-1:2003
Fibre optic connector interfaces. Type MU connector family. Simplified receptacle MU-PC connector interfaces

BS EN 61754-6:2013
Fibre optic interconnecting devices and passive components. Fibre optic connector interfaces. Type MU connector family

BS EN 61754-7-1:2014
Fibre optic interconnecting devices and passive components. Fibre optic connector interfaces. Type MPO connector family. One fibre row

BS EN 61754-7:2008
Fibre optic interconnecting devices and passive components. Fibre optic connector interfaces. Type MPO connector family

BS EN 61754-8:1997
Fibre optic connector interfaces. Part 8 Type CF08 connector family

BS EN 61754-9:2001
Fibre optic connector interfaces. Part 9 Type DS connector family

BS EN 61754-10:2005
Fibre optic connector interfaces. Part 10 Type Mini-MPO connector family

BS EN 61754-12:2000
Fibre optic connector interfaces. Part 12 Type FS connector family

BS EN 61754-13:2006
Fibre optic connector interfaces. Type FC-PC connector

BS EN 61754-15:2009
Fibre optic connector interfaces. Part 15 Type LSH connector family

BS EN 61754-16:2000
Fibre optic connector interfaces. Part 16 Type PN connector family

BS EN 61754-18:2002
Fibre optic connector interfaces. Type MT-RJ connector family

BS EN 61754-19:2002
Fibre optic connector interfaces. Part 19 Type SG connector family

BS EN 61754-20-100:2012
Fibre optic interconnecting devices and passive components. Fibre optic connector interfaces. Interface standard for LC connectors with protective housings related to IEC 61076-3-106

BS EN 61754-20:2012
Fibre optic interconnecting devices and passive components. Fibre optic connector interfaces. Type LC connector family

BS EN 61754-21:2005
Fibre optic connector interfaces. Type SMI connector family for plastic optical fibre

BS EN 61754-22:2005
Fibre optic connector interfaces. Type F-SMA connector family

BS EN 61754-23:2005
Fibre optic connector interfaces. Type LX.5 connector family

BS EN 61754-24-11:2009
Fibre optic interconnecting devices and passive components. Fibre optic connector interfaces. Type SC-RJ connectors with protective housings based on IEC 61076-3-117

BS EN 61754-24-21:2009
Fibre optic interconnecting devices and passive components. Fibre optic connector interfaces. Type SC-RJ connectors with protective housings based on IEC 61076-3-106, variant 06

BS EN 61754-24:2010
Fibre optic interconnecting devices and passive components. Fibre optic connector interfaces. Type SC-RJ connector family

BS EN 61754-25:2009
Fibre optic connector interfaces. Type RAO connector family

BS EN 61754-26:2012
Fibre optic interconnecting devices and passive components. Fibre optic connector interfaces. Type SF connector family

BS EN 61754-27:2013
Fibre optic interconnecting devices and passive components. Fibre optic connector interfaces. Type M12-FO connector family

BS EN 61754-28:2012
Fibre optic interconnecting devices and passive components. Fibre optic connector interfaces. Type LF3 connector family

BS EN 61754-29:2012
Fibre optic interconnecting devices and passive components. Fibre optic connector interfaces. Type BLINK connector series

BS EN 61754-30:2014
Fibre optic interconnecting devices and passive components. Fibre optic connector interfaces. Type CLIK connector series

BS EN 61914:2016
Cable cleats for electrical installations

BS EN 61984:2009
Connectors. Safety requirements and tests

BS EN 62012-1:2002
Multicore and symmetrical pair/quad cables for digital communications to be used in harsh environments. Part 1 Generic specification

BS EN 62148-2:2011
Fibre optic active components and devices. Package and interface standards. SFF 10-pin transceivers

BS EN 62148-3:2011
Fibre optic active components and devices. Package and interface standards. SFF 20-pin transceivers

BS EN 62148-4:2003
Fibre optic active components and devices. Package and interface standards. PN 1x9 plastic optical fibre transceivers

BS EN 62148-5:2003
Fibre optic active components and devices. Package and interface standards. SC 1x9 fibre optic modules

BS EN 62148-6:2003
Fibre optic active components and devices. Package and interface standards. ATM-PON transceivers

BS EN 62148-11:2009
Fibre optic active components and devices. Package and interface standards. 14-pin active device modules

BS EN 62148-12:2004
Fibre optic active components and devices. Package and interface standards. Laser transmitters with coaxial RF connector

BS EN 62148-15:2014
Fibre optic active components and devices. Package and interface standards. Discrete vertical cavity surface emitting laser packages

BS EN 62148-16:2009
Fibre optic active components and devices. Package and interface standards. Transmitter and receiver components for use with LC connector interface

BS EN 62148-17:2014
Fibre optic active components and devices. Package and interface standards. Transmitter and receiver components with dual coaxial RF connectors

BS EN 62148-18:2015
Fibre optic active components and devices. Package and interface standards. 40-Gbit/s serial transmitter and receiver components for use with the LC connector interface

BS EN 62275:2015
Cable management systems. Cable ties for electrical installations

BS EN 62444:2013
Cable glands for electrical installations.

BS EN 62664-1-1:2013
Fibre optic interconnecting devices and passive components. Fibre optic connector product specifications. LC-PC duplex multimode connectors terminated on IEC 60793-2-10 category A1a fibre

BS EN 186110:1995
Harmonized system of quality assessment for electronic components. Sectional specification: connector sets for optical fibres and cables. Type FC

BS EN 186130:1996
Harmonized system of quality assessment for electronic components. Sectional specification. Connector sets for optical fibres and cables. Type LSA

BS EN 186150:1997
Connector sets for optical fibres and cables. Type OCCA-BU

BS EN 186160:1997
Connector sets for optical fibres and cables. Type OCCA-PC

BS EN 186180:1996
Harmonized system of quality assessment for electronic components. Sectional specification. Connector sets for optical fibres and cables. Type LSB

BS EN 186220:1996
Harmonized system of quality assessment for electronic components. Sectional specification: Connector sets for optical fibres and cables. Type LSC

BS EN 186230:1996
Harmonized system of quality assessment for electronic components. Sectional specification: connector sets for optical fibres and cables. Type LSF

BS EN 186260:1998
Harmonized system of quality assessment for electronic components. Sectional specification: connector sets for optical fibres and cables. Type SC

BS EN 186270:1998
Harmonized system of quality assessment for electronic components. Sectional specification: connector sets for optical fibres and cables. Type LSH

BS EN 187103:2003
Harmonized system of quality assessment for electronic components. Family specification. Optical fibre cables for indoor applications

BS EN ISO 7010:2012+A7:2017
Graphical symbols. Safety colours and safety signs. Registered safety signs

BS EN ISO 9453:2014
Soft solder alloys. Chemical compositions and forms

BS IEC 60874-14-1:1997
Connectors for optical fibres and cables. Part 14-1 Detail specification for fibre optic connector type SC-PC standard terminated to multimode fibre type A1 a, A1b

BS IEC 60874-14-3:1997
Detail specification for fibre optic adaptor (simplex) type SC for single-mode fibre

BS IEC 60874-14-4:1997
Detail specification for fibre optic adaptor (simplex) type SC for multimode fibre

BS IEC 60874-14-5:1997

Connectors for optical fibres and cables. Detail specification for fibre optic connector type SC-PC untuned terminated to single-mode fibre type B1

Y62 BUSBAR TRUNKING

1010 BUSBAR TRUNKING SYSTEMS STANDARDS:
- Supply and install busbar trunking systems in accordance with BS 7671 Requirements for Electrical Installations (The IET Wiring Regulations).

1020 POWER TRACK SYSTEMS:
- Supply and install busbar trunking systems in accordance with BS EN 61534-1 and in particular the requirements of BS 7671 Requirements for Electrical Installations (The IET Wiring Regulations).

2000 PRODUCTS/MATERIALS

2010A GENERAL PURPOSE BUSBAR :
- System characteristics
  - Electrical Supply - Voltage between phases 400 volts; frequency 50 Hz.
  - Rate system to withstand a short circuit fault current of 21 kA.
  - Short time rating - 0.2 seconds.
- Busbar
  - Use high conductivity busbars and connections.
  - Material - Copper.
  - Number of Poles - 3-phase and full size neutral.

2020A GENERAL PURPOSE STEEL BUSBAR TRUNKING:
- Busbar trunking type
  - Surface; flush; bench or underfloor.
- Busbar
  - Y62.2010A
- Steel enclosure
  - Comply with relevant sections of BS 4678.
  - Apply high standard of finish to busbar trunking. For a painted finish apply a minimum of one coat rust inhibiting primer, one undercoat and two semi-gloss finish coats.
  - Remove rust and degrease metal prior to application of selected finish. Zinc coated steel is acceptable as anti-rust treatment.
  - Use rust-proofed (e.g. cadmium plated) screws, bolts, nuts and washers.
  - Finish - Paint or stoved enamel.
  - Colour- Manufacturer's standard colour.
- Fittings
  - Use trunking fittings of the same type and manufacture as the busbar trunking. Use screw fixed covers. Use manufacturer's purpose made units at changes of direction.
- Supply termination
  - Provide facilities for the correct termination of supply cable.
- Fixings
  - Provide external fixing brackets at not greater than 2m intervals. In accordance with manufacturer's instructions and recommendations.
- Marking
  - Provide clear marking of busbars and tap-off outlet sockets with phase colours to enable sequence identification throughout system.

2025A WALL/DADO TRUNKING WITH LV SOCKETS:
- Standard - BS EN 61534-21.
- Style - Dado.
- Fittings - Use fittings of same type and manufacturer as trunking with snap on covers.
- Provide facilities for termination of supply.
- Connection of LV sockets - Plug in.

2025B UNDERFLOOR TRUNKING WITH LV SOCKETS:
- Standard
  - BS EN 61534-1
  - BS EN 61534-22.
- Style - Underfloor.
- Fittings - Use fittings of same type and manufacturer as trunking with snap on covers.
- Provide facilities for termination of supply.
- Connection of LV sockets - Plug in.

2030A TAP-OFF UNITS:
- Standard BS EN 61534-1.
- Underfloor systems - BS EN 61534-22.
- Provide tap-off facilities along the busbar system at intervals as indicated.
- Provide tap-off units with fuses, current rating, class and type as indicated; termination points for outgoing cables in every tap-off unit; and isolating switch with number of poles as indicated.

2040A INTERNAL PROTECTIVE CONDUCTORS:
- Standard BS EN 61534-1.
- Provide protective conductor throughout busbar system length to manufacturer's standard.
  - Busbar pole with tap-off at each socket for wall/dado type with integral socket outlets.
- Install protective conductor internally to busbar enclosure.
- Bond protective conductor to trunking enclosure using a method in accordance with BS 7430 at 1.2m maximum intervals.
- Use high tensile brass bolts and locking nuts.
- Complete trunking system before installing the protective conductor.
- Ensure the continuity of protective circuits.

3000 WORKMANSHIP

3010 GENERAL:
- Install busbar trunking in accordance with manufacturer's instructions and the relevant standards.
- Check total length of busbar system required on-site prior to manufacture commencing.
- Fit covers at end of each run or provide proprietary end boxes.

3020 BONDING:
- Bond between adjacent lengths of busbar trunking with approved mechanical means to maintain conductivity, where two or more parallel runs of busbar trunking occur. Tighten bolted connections between adjacent lengths of busbars to correct torque setting. Avoid damage to conductors.

3030 EXPANSION:
- Anchor busbars rigidly in a minimum of one position and provide means of absorbing maximum expansion and contraction likely to occur in busbars under normal operating conditions.
- Provide expansion joints in each length of run

3050 FIRE BARRIERS:
- Provide barriers of fire-resisting materials within the busbar trunking where vertical runs pass through floors and horizontal runs pass through fire break walls to prevent spread of fire. (BS 7671 Section 527).

BS APPENDIX

BS 4678-4:1982
Cable trunking. Part 4 Specification for cable trunking made of insulating material.

BS 4800:2011
Schedule of paint colours for building purposes

BS 7430:2011+A1:2015
Code of practice for protective earthing of electrical installations

BS 7671:2018
Requirements for electrical installations. IET Wiring Regulations

BS EN 50085-1:2005+A1:2013
Cable trunking systems and cable ducting systems for electrical installations. General requirements

BS EN 50085-2-1:2006+A1:2011
Cable trunking systems and cable ducting systems for electrical installations. Part 2-1 Cable trunking systems and cable ducting systems intended for mounting on walls and ceilings

BS EN 50085-2-3:2010
Cable trunking and cable ducting systems for electrical installations. Part 2-3 Particular requirements for slotted cable trunking systems intended for installation in cabinets.

BS EN 50085-2-4:2009
Cable trunking systems and cable ducting systems for electrical installations Part 2-4 Particular requirements for service poles and service posts

BS EN 60529:1992+A2:2013
Degrees of protection provided by enclosures (IP code)

BS EN 61534-1:2011+A1:2014
Powertrack systems. Part 1 General requirements

BS EN 61534-21:2014
Powertrack systems. Particular requirements for powertrack systems intended for wall and ceiling mounting

BS EN 61534-22:2014
Powertrack systems. Part 22 Particular requirements for powertrack systems intended for onfloor or under floor installation

Y63 SUPPORT COMPONENTS - CABLES

1010 APPLICATION:
- Cables referred to in this section are only those types that can be installed without further mechanical protection.

2000 PRODUCTS/MATERIALS

2010A CABLE SUPPORTS AND FINISHES:
- Cable supports
  - Support all cables throughout their length using conduit; or trunking and enclosures; or cable tray; or cable racking; or special support systems; or cleat or clip fixing direct to building fabric as indicated on the drawings/schedules.
  - Ensure tray, racking and special support systems are continuous and firmly fixed to building fabric. Allow space for additional cables as indicated on the drawings/schedules.
  - Ensure cable support system allows for spacing in accordance with BS 7671 for the design current of the cable.
  - Ensure cable support system is installed so that cables are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).
- Fixings finishes
  - Ensure finish for all support components, fixings, hangers and accessories is as cable support system or manufacturer's standard.

2020A CABLE SUPPORT SYSTEM - PERFORATED TRAY:
- Type - Flanged or return flanged.
- Perforations
  - Admiralty pattern for light or medium duty; GDCD pattern standard 23; or manufacturer's standard pattern.
- Thickness - Manufacturer's standard thickness for type.
- Fittings
  - Use factory made fittings throughout of same material, type, pattern, finish and thickness as cable tray.
  - Use reducers, inside angles and outside angles as manufacturer's standard.
  - Use flat bends, equal tees, unequal tees and crosses with corners gusseted.
  - Join lengths of tray and fittings using manufacturer's standard shouldered ends, fish plates, or couplers, with galvanized or zinc plated slotted domed head `roofing' bolts, nuts, washers and shakeproof washers.
- Material
  - Hot rolled steel galvanized after manufacture to BS EN 10346 or BS EN 10143.
- Finish - Self colour galvanized.
- Ensure cable tray is installed so that the wiring system is not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).
- Ensure that any cables not sitting on the top surface of the tray are secured so that they are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).

2020B CABLE SUPPORT SYSTEM - CABLE RACK:
- Proprietary system of channel sections with return lip and compatible jointing and fixing accessories
- Fittings
  - Use factory made fittings throughout of same material finish and section as rack, for risers, bends, reducers, tees, crosses and drop outs.
- Material
  - Hot rolled steel galvanized after manufacture to BS EN 10346 or BS EN 10143.
- Finish - Self colour galvanized.
- Ensure cable rack is installed so that the wiring system is not liable to premature collapse in the event

of a fire, in accordance with BS 7671 (IET Wiring Regulations).
- Ensure that any cables not sitting on the top surface of the rack are secured so that they are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).

2025A CABLE SUPPORT SYSTEM - PROPRIETARY CABLE TIES:
- Two piece cable tray pattern, on cable tray only. Wrap round self locking non releasable pattern on everything except cable trays.
- Ensure all wiring system components are selected and installed so that wiring systems are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).

2025B CABLE SUPPORT SYSTEM - CABLE CLIPS:
- Polypropylene surface type with pre-fixed hardened steel pin for general use except on mineral insulated cables.
- For mineral insulated cables use bright copper one hole `P' clips for unsheathed mineral insulated cables, PVC covered for sheathed mineral insulated cables.
- Ensure all cable supports are selected and installed so that the wiring systems are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).

2025C CABLE SUPPORT SYSTEM - TWO WAY SADDLES:
- Bright copper for unsheathed mineral insulated cables. PVC covered bright copper for sheathed mineral insulated cables.

2025D CABLE SUPPORT SYSTEM - CABLE BASKET:
- Proprietary system of wire basket with compatible jointing and fixing accessories.
- Fittings
  - Use factory made fittings throughout of same material finish as basket, for risers, bends, reducers, tees, crosses and drop outs.
- Ensure all wiring containment systems are selected and installed so that they are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).

2025E CABLE SUPPORT SYSTEM - CABLE CLEATS:
- One piece or single way pattern or claw pattern or two bolt pattern to BS EN 61914
- Material
  - Die cast aluminium alloy; moulded black polyethylene; or nylon.
- Finish - Self finish.

3000 WORKMANSHIP

3010 CABLE TRAY INSTALLATION:
- Support from building fabric with minimum clearance behind of 20mm. Install fixings at regular intervals to prevent visible sagging when loaded, with maximum spacing 1.2m and 230mm from fittings.
- Keep cutting of cable tray to a minimum. Cut along a line of unperforated metal. Make good finish with zinc rich paint, primer and top coat, or two pack epoxy paste, as appropriate to tray material and finish.
- Fit holes cut in tray for passage of cables with grommets, bushes or other lining.
- Install all bolts, fixings and hangers with threaded portion away from cables. Cable routes to cross at right angles or spacing to BS EN 50374.
- Ensure all wiring containment systems are selected and installed so that they are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).

3020A CABLE CLEATS, TIES, SADDLES AND CLIPS INSTALLATION:

- For cables on horizontal tray use ties for each circuit. Use tie manufacturer's special tensioning tool where available. Crop off tie ends.
- For cables on vertical tray use cleats bolted to tray for paper, plastic or elastomeric insulated cables and saddles or clips for mineral insulated cables. Use cleats sized to grip cables firmly without undue pressure or strain on cable, but preventing slipping.
- For cables on vertical or horizontal rack use proprietary fixings to rack for paper, plastic or elastomeric insulated cables and saddles or clips for mineral insulated cables. On continuous flat surfaces of wood, plaster, brick etc.
  - Use polypropylene surface fixing clips with prefixed hardened steel pin for PVC insulated and sheathed cables and sheathed or bright mineral insulated cables. Use round or flat or flat twin pattern as appropriate, manufactured specifically for cable being fixed.
  - Use one hole 'P' clips or two way saddles of bright copper for unsheathed mineral insulated cable. Use PVC covered for sheathed mineral insulated cables.
- Space cleats, ties, saddles and clips
  - As Appendix G of Guidance Note 1: Selection and Erection published by the IET.
- Ensure all cable supports are selected and installed so that the wiring systems are not liable to premature collapse in the event of a fire, in accordance with BS 7671 (IET Wiring Regulations).

BS APPENDIX

BS 7671:2018
Requirements for electrical installations. IET Wiring Regulations

BS EN 10143:2006
Continuously hot-dip coated steel sheet and strip. Tolerances on dimensions and shape

BS EN 10346:2015
Continuously hot-dip coated steel flat products for cold forming. Technical delivery conditions

BS EN 12385-1:2002+A1:2008
Steel wire ropes. Safety. Part 1 General requirements

BS EN 13411-3:2004+A1:2008
Terminations for steel wire ropes. Safety. Part 3 Ferrules and ferrule-securing

BS EN 13411-4:2011
Terminations for steel wire ropes. Safety. Part 4 Metal and resin socketing

BS EN 50374:2004
Conductor cars

BS EN 61537:2007
Cable management. Cable tray systems and cable ladder systems

BS EN 61914:2016
Cable cleats for electrical installations

BS EN ISO 1461:2009
Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods

Y7 General Electrical Equipment

Y71 LV SWITCHGEAR AND DISTRIBUTION BOARDS

1020 ELECTRICITY SUPPLY:
- Ensure all electrical equipment supplied and installed is suitable for power supply indicated to BS EN 60038 and relevant parts of BS EN 61558

2000 PRODUCTS/MATERIALS

2010A CUBICLE SWITCHBOARD - LV SWITCHGEAR AND CONTROLGEAR ASSEMBLY:
- Standard - BS EN 61439-1.
- External design - Cubicle type assembly.
- Usage - Switchboard.
- Conditions of installation - Indoors.
- Electrical characteristics
  - Rated operational voltage 400 V + 10% / -11%
- Service conditions
  - Ambient air temperature and altitude to relevant parts of BS EN 61439.
- Co-ordination in accordance with BS 7671 (IET Wiring Regulations)
  - Ensure that the relevant fault current (short-circuit) rating of each switchgear and controlgear assembly is greater than or equal to the maximum prospective fault current at the point of connection to the system.
  - Ensure that the relevant design current does not exceed the rated current of the system, or rated current of a circuit of the associated assembly, taking into account applicable diversity and loading factors.
  - Ensure that any devices and components are integrated into the assembly in accordance with the relevant parts of BS EN 61439.

2010B CUBICLE CONTROL PANEL - LV SWITCHGEAR AND CONTROLGEAR ASSEMBLY:
- Standard - BS EN 61439-1.
- External design - Cubicle type assembly.
- Usage - Control panel.
- Conditions of installation - Indoors.
- Electrical characteristics
  - Rated operational voltage 400 V + 10% / - 11%
- Service conditions
  - Ambient air temperature and altitude to relevant parts of BS EN 61439.
- Co-ordination in accordance with BS 7671 (IET Wiring Regulations)
  - Ensure that the relevant fault current (short-circuit) of each switchgear and controlgear assembly is greater than or equal to the maximum prospective fault current at the point of connection to the system.
  - Ensure that the relevant design current does not exceed the rated current of the assembly, or rated current of a circuit of the associated assembly, taking into account applicable diversity and loading factors.
  - Ensure that any devices and components are integrated into the assembly in accordance with the relevant parts of BS EN 61439.

2010C MULTI-BOX SWITCHBOARD - LV SWITCHGEAR AND CONTROLGEAR ASSEMBLY:
- Standard - BS EN 61439-1.
- External design - Multi-box type assembly.
- Usage - Switchboard.
- Conditions of installation - Indoors.
- Electrical characteristics

- Rated operational voltage 400 V + 10% / - 11%
- Service conditions
  - Ambient air temperature and altitude to relevant parts of BS EN 61439.
- Co-ordination in accordance with BS 7671 (IET Wiring Regulations)
  - Ensure that the relevant fault current (short-circuit) rating of each switchgear and controlgear assembly is greater than or equal to the maximum prospective fault current at the point of connection to the system.
  - Ensure that the relevant design current does not exceed the rated current of the assembly, or rated current of a circuit of the associated assembly, taking into account applicable diversity and loading factors.
  - Ensure that the devices and components are integrated into the assembly in accordance with the relevant parts of BS EN 61439.

2010D MULTI-BOX CONTROL PANEL - LV SWITCHGEAR AND CONTROLGEAR ASSEMBLY:
- Standard - BS EN 61439-1.
- External design - Multi-box type assembly.
- Usage - Control panel.
- Conditions of installation - Indoors.
- Electrical characteristics
  - Rated operational voltage 400 V + 10% / - 11%
- Service conditions
  - Ambient air temperature and altitude to relevant parts of BS EN 61439.
- Co-ordination in accordance with BS 7671 (IET Wiring Regulations)
  - Ensure that the relevant fault current (short-circuit) rating of each switchgear and controlgear assembly is greater than or equal to the maximum prospective fault current at the point of connection to the system.
  - Ensure that the relevant design current does not exceed the rated current of the assembly, or rated current of a circuit of the associated assembly, taking into account applicable diversity and loading factors.
  - Ensure that any devices and components are integrated into the assembly in accordance with the relevant parts of BS EN 61439

2020A FLOOR STANDING ASSEMBLY CONSTRUCTION:
- Enclosure standard - BS EN 62208.
- Material of enclosure - Manufacturer's standard.
- Terminals for external conductors, main power circuits
  - Accommodate cross-sectional area of copper cables in accordance with BS EN 61439-1.
- Terminals for external conductor, control and auxiliary circuits
  - Terminal block. Mounting as manufacturer's standard.
- Size of neutrals on 3-phase supplies - Full sized.
- Degree of protection to BS EN 60529, IP31 for assembly.
- Protection against direct and indirect contact
  - Manufacturer's standard.
- Accessibility for inspection
  - Arrange for following operations to be performed when assembly is in service and under voltage
    - Visual inspection of switching devices and other apparatus; settings and indicators of relays and releases; conductor connections and markings.
    - Adjusting and re-setting of relays, releases and electronic devices.
    - Replacement of fusel inks and indicating lamps.
    - Fault location by voltage and current measuring.
- Accessibility for maintenance
  - Provide space between functional unit or group and adjacent functional units or groups. Provide retainable fastening means for parts likely to be removed for maintenance.
- Removable parts and withdrawable parts as manufacturer's standard.
- Internal separation to BS EN 61439-2.

- Form 4a.
  - Type 2
- Form 4b.
  - Type 2
- Input voltage variations for electronic equipment supply - BS EN 61439
- Supply frequency deviation - BS EN 61439
- Mounting - Floor standing.

2020B WALL-MOUNTED ASSEMBLY CONSTRUCTION:
- Enclosure standard - BS EN 62208.
- Material of enclosure - Manufacturer's standard.
- Terminals for external conductors, main power circuits
  - Accommodate cross-sectional area of copper cables in accordance with BS EN 61439-1.
- Terminals for external conductor, control and auxiliary circuits
  - Terminal block. Mounting as manufacturer's standard.
- Size of neutrals on 3-phase supplies - Full sized.
- Degree of protection to BS EN 60529, IP31 for assembly.
- Protection against direct and indirect contact
  - Manufacturer's standard.
- Accessibility for inspection
  - Arrange for following operations to be performed when assembly is in service and under voltage
    - Visual inspection of switching devices and other apparatus; settings and indicators of relays and releases; conductor connections and markings.
    - Adjusting and re-setting of relays, releases and electronic devices.
    - Replacement of fusel inks and indicating lamps.
  - Fault location by voltage and current measuring.
- Accessibility for maintenance
  - Provide space between functional unit or group and adjacent functional units or groups. Provide retainable fastening means for parts likely to be removed for maintenance.
- Removable parts and withdrawable parts as manufacturer's standard.
- Internal separation to BS EN 61439-2.
  - Form 4a
    - Type 2
  - Form 4b
    - Type 2
- Input voltage variations for electronic equipment supply - relevant parts of BS EN 61439.
- Supply frequency deviation - relevant parts of BS EN 61439.
- Mounting - Wall-mounted.

2030A ENCLOSURE FINISH:
- Apply high standard finish to enclosure and supporting metalwork. Degrease metal and remove rust prior to applying finish.
- Comply with paint manufacturer's recommendations regarding preparation, stoving times, temperatures, mixing of finishes, application and coat thickness.
- Finish - Manufacturer's standard.
- Colour - Manufacturer's standard colour.

2060 SITE BUILT ASSEMBLIES:
- Ensure that components of site assemblies are part of a proprietary system and type tested as appropriate.
- Install assemblies in accordance with manufacturer's drawings and instructions.

2070 SITE MODIFICATION:
- Do not make site alterations unless authorised. Where site modifications to assemblies are authorised make in accordance with manufacturer's certified drawings and instructions. Ensure that modifications

made comply with type test certificate obtained for arrangement of components.

2080A WALL-MOUNTED, TOP ENTRY BATTERY CHARGER AND BATTERY UNIT:

- Supply a unit for tripping.
- Input Supply - 230 V single-phase 50 Hz.
- DC Output
  - Voltage - 50 Volt -20% +10%
  - Operating temperature range - -10°C - 45°C.
  - Charger type - Thyristor or transistor.
  - Battery type
    - Lead acid (sealed) or Nickel Cadmium (maintenance free).
  - Cubicle (sheet steel) - Wall-mounted.
  - Cable entry - Top.
  - Finish - Manufacturer's standard.
  - Colour - Manufacturer's standard.
  - Ventilation - Natural.
  - Facilities - MCB input protection; float charge.
  - Battery over-discharge protection
    - Fuses for battery protection; MCB's for outgoing circuits; automatic selection of boost charge.
  - Meters
    - Battery voltage; charging current (dual scale for float and boost); output current.
  - Lamp indications
    - Supply on; supply fail (monitor input terminals); float charge; boost charge; no charge (when supply is on); battery voltage low; battery voltage high.
  - Alarms (connected to operate a relay with shrouded 230V3A a.c. or 0.5A d.c. N/C volt free contacts, closed on any alarm, for remote indication circuit)
  - Supply failed; no charge (when supply is on); battery voltage low; battery voltage high.

2080B WALL-MOUNTED, BOTTOM ENTRY, BATTERY CHARGER AND BATTERY UNIT:

- Supply a unit for tripping.
- Input Supply - 230 V single-phase 50 Hz.
- DC Output
  - Voltage - 50 Volt -20% +10%
  - Operating temperature range - -10°C - 45°C.
  - Charger type - Thyristor or transistor.
  - Battery type
  - Lead acid (sealed) or Nickel Cadmium (maintenance free).
  - Cubicle (sheet steel) - Wall-mounted.
  - Cable entry - bottom.
  - Finish - Manufacturer's standard.
  - Colour - Manufacturer's standard.
  - Ventilation - Natural.
  - Facilities - MCB input protection; float charge.
  - Battery over-discharge protection
    - Fuses for battery protection; MCB's for outgoing circuits; automatic selection of boost charge.
  - Meters
    - Battery voltage; charging current (dual scale for float and boost); output current.
  - Lamp indications
    - Supply on; supply fail (monitor input terminals); float charge; boost charge; no charge (when supply is on); battery voltage low; battery voltage high.
  - Alarms (connected to operate a relay with shrouded 230V 3A a.c. or 0.5A d.c. N/C volt free contacts, closed on any alarm, for remote indication circuit)
    - Supply failed; no charge (when supply is on); battery voltage low; battery voltage high.

2080C FLOOR STANDING, TOP ENTRY, BATTERY CHARGER AND BATTERY UNIT:

- Supply a unit for tripping.

- Input Supply - 230 V single-phase 50 Hz.
- DC Output
  - Voltage - 50 Volt -20% +10%
  - Operating temperature range - -10°C - 45°C.
  - Charger type - Thyristor or transistor.
  - Battery type - Lead acid (sealed) or Nickel Cadmium (maintenance free).
  - Cubicle (sheet steel) - Floor standing.
  - Cable entry - Top.
  - Finish - Manufacturer's standard.
  - Colour - Manufacturer's standard.
  - Ventilation - Natural.
  - Facilities - MCB input protection; float charge.
  - Battery over-discharge protection
    - Fuses for battery protection; MCB's for outgoing circuits; automatic selection of boost charge.
  - Meters
    - Battery voltage; charging current (dual scale for float and boost); output current.
  - Lamp indications
    - Supply on; supply fail (monitor input terminals); float charge; boost charge; no charge (when supply is on); battery voltage low; battery voltage high.
  - Alarms (connected to operate a relay with shrouded 230V 3A AC or 0.5A DC N/C volt free contacts, closed on any alarm, for remote indication circuit)
    - Supply failed; no charge (when supply is on); battery voltage low; battery voltage high.

2080D FLOOR STANDING, BOTTOM ENTRY, BATTERY CHARGER AND BATTERY UNIT:

- Supply a unit for tripping.
- Input Supply - 230 V single-phase 50 Hz.
- DC Output
  - Voltage - 50 Volt -20% +10%
  - Operating temperature range - -10°C - 45°C.
  - Charger type - Thyristor or transistor.
  - Battery type - Lead acid (sealed) or Nickel Cadmium (maintenance free).
  - Cubicle (sheet steel) - Floor standing.
  - Cable entry - bottom.
  - Finish - Manufacturer's standard.
  - Colour - Manufacturer's standard.
  - Ventilation - Natural.
  - Facilities - MCB input protection; float charge.
  - Battery over-discharge protection
    - Fuses for battery protection; MCB's for outgoing circuits; automatic selection of boost charge.
  - Meters
    - Battery voltage; charging current (dual scale for float and boost); output current.
  - Lamp indications
    - Supply on; supply fail (monitor input terminals); float charge; boost charge; no charge (when supply is on); battery voltage low; battery voltage high.
  - Alarms (connected to operate a relay with shrouded 230V 3A AC or 0.5A DC N/C volt free contacts, closed on any alarm, for remote indication circuit).
    - Supply failed; no charge (when supply is on); battery voltage low; battery voltage high.

2090A UTILISATION A, WITHDRAWABLE AIR BREAK CIRCUIT BREAKERS:

- Provide circuit breakers in accordance with BS EN 60947-2. Ensure that uninterrupted current rating indicated applies when unit is enclosed and in operating environment at rated operational voltage.
- Details of equipment - circuit breaker
  - Characteristics of circuit breakers
    - AC Interrupting medium - air.
- Rated and limiting values for the main circuit
  - Rated voltage - operational, 400V.
  - Rated frequency 50 Hertz.

- Circuit breaker utilisation category - A (without intentional time delay and a short time withstand current rating).
- Enclosure degree of protection IP31.
- Circuit breakers and switches
  - Provide metal clad withdrawable isolating removable type circuit breakers with provision for safe maintenance.
  - Closing mechanism
    - Independent manual spring operated.
  - Provide automatic shutters to cover all live contacts when circuit breaker is isolated, withdrawn or removed from housing.
  - Provide a padlock to lock circuit breaker in isolated/withdrawn position, and to lock automatic shutters covering live contacts when removed from housing.
  - Provide withdrawable air circuit breakers with provision for safe maintenance.

2090B UTILISATION A, DEMOUNTABLE MCCB AIR BREAK CIRCUIT BREAKERS:

- Provide circuit breakers in accordance with BS EN 60947-2. Ensure that uninterrupted current rating indicated applies when unit is enclosed and in operating environment at rated operational voltage.
- Details of equipment - circuit breaker
  - Characteristics of circuit breakers
    - AC Interrupting medium - air.
- Rated and limiting values for the main circuit
  - Rated voltage - operational, 400V.
  - Rated frequency 50 Hertz.
  - Circuit breaker utilisation category - A.
  - Enclosure degree of protection IP31.
- Circuit breakers and switches
  - Provide manual closing air-break circuit breakers, (MCCB).
  - Closing mechanism
    - Independent manual spring operated.
  - Provide automatic shutters to cover all live contacts when circuit breaker is isolated, withdrawn or removed from housing.
  - Provide a padlock to lock circuit breaker in isolated/withdrawn position, and to lock automatic shutters covering live contacts when removed from housing.
  - Provide demountable moulded case circuit breakers with provision for safe maintenance.

2090C UTILISATION B, WITHDRAWABLE AIR BREAK CIRCUIT BREAKERS:

- Provide circuit breakers in accordance with BS EN 60947-2. Ensure that uninterrupted current rating indicated applies when unit is enclosed and in operating environment at rated operational voltage.
- Details of equipment - circuit breaker
  - Characteristics of circuit breakers
    - AC Interrupting medium - air.
- Rated and limiting values for the main circuit
  - Rated voltage - operational, 400V.
  - Rated frequency 50 Hertz.
  - Circuit breaker utilisation category - B (with intentional time delay and a short time withstand current rating).
  - Enclosure degree of protection IP31.
- Circuit breakers and switches
  - Provide metal clad withdrawable isolating removable type air circuit breakers with provision for safe maintenance.
  - Closing mechanism
    - Independent manual spring operated.
  - Provide automatic shutters to cover all live contacts when circuit breaker is isolated, withdrawn or removed from housing.
  - Provide a padlock to lock circuit breaker in isolated/withdrawn position, and to lock automatic shutters covering live contacts when removed from housing.
  - Provide withdrawable air circuit breakers with provision for safe maintenance.

2090D UTILISATION B, DEMOUNTABLE MCCB AIR BREAK CIRCUIT BREAKERS:

- Provide circuit breakers in accordance with BS EN 60947-2. Ensure that uninterrupted current rating indicated applies when unit is enclosed and in operating environment at rated operational voltage.
- Details of equipment - circuit breaker
  - Characteristics of circuit breakers
    - AC Interrupting medium - air.
- Rated and limiting values for the main circuit
  - Rated voltage - operational, 400V.
  - Rated frequency 50 Hertz.
  - Circuit breaker utilisation category - B (with intentional time delay and a short time withstand current rating).
  - Enclosure degree of protection IP31.
- Circuit breakers and switches
  - Provide manual closing air-break circuit breakers, (MCCB).
  - Closing mechanism
    - Independent manual spring operated.
  - Provide automatic shutters to cover all live contacts when circuit breaker is isolated, withdrawn or removed from housing.
  - Provide a padlock to lock circuit breaker in isolated/withdrawn position, and to lock automatic shutters covering live contacts when removed from housing.
  - Provide demountable moulded case circuit breakers with provision for safe maintenance.

2100A SWITCH DISCONNECTORS:

- Supply switch disconnectors in accordance with the following standards:
  - BS EN 60947-3
  - BS EN 62626-1
- Details of equipment - switch-disconnector
  - AC Interrupting medium - air.
- Rated and limiting values for the main circuit
  - Rated voltage (Volts) 230/400.
  - Rated frequency 50 Hertz.
  - Utilisation category - AC-23A, or AC-3 where BS EN 62626-1 applies.
  - Enclosure degree of protection IP65.
  - Fit each switch with facility to padlock in OFF position.
  - Provide switches with auxiliary contacts as indicated. Where switches isolate final connections between a starter and its motor, fit one set of contacts to open starter coil circuit when switch is opened.

2100B FUSE COMBINATION UNITS:

- Supply fuse combination units in accordance with BS 88 (BS EN 60269).
- Standard
  - BS EN 60947-3.
  - BS EN 62626-1.
- Details of equipment - fuse combination unit
  - AC interrupting medium - air.
- Rated and limiting values for the main circuit
  - Rated voltage (Volts) 230/400.
  - Rated frequency 50 Hertz.
  - Utilisation category - AC-23A, or AC-3 where BS EN 62626-1 applies.
  - Enclosure degree of protection IP31.
  - Fit removable neutral link in switches controlling circuits with neutral conductor.
  - Fit solid links in isolating switches.
  - Fit each switch with facility to padlock in OFF position.
  - Ensure that withdrawable chassis isolating type switches are provided with fully shrouded fixed contacts or insulated cover plates, to prevent accidental contact with live parts.

- Ensure that switches in individual enclosures have an earth terminal, meet the degree of protection for the switchboard and have operating mechanisms interlinked with access door.
- Provide switches with auxiliary contacts as indicated. Where switches isolate final connections between a starter and its motor, fit one set of contacts to open starter coil circuit when switch is opened.

2110A AUTOMATIC RESET PROTECTION DEVICES INTERPOSING RELAYS AND INTER-TRIPPING RELAYS:
Standard - BS EN 61810.
- Housing
  - Flush panel mounting type. House all protection relays, excluding motor protection relays, in draw out cases.
- Reset type - Automatic reset type.
- Overcurrent tripping device
  - Provide overcurrent tripping device with overcurrent characteristic similar to a BS 2692 high voltage cartridge fuse, sized to protect the equipment/load.

2110B MANUAL RESET PROTECTION DEVICES INTERPOSING RELAYS AND INTERTRIPPING RELAYS:
- Standard - BS EN 61810.
- Housing
  - Flush panel mounting type. House all protection relays, excluding motor protection relays, in draw out cases.
- Reset type - Manual reset type.
- Overcurrent tripping device
  - Provide overcurrent tripping device with overcurrent characteristic similar to a BS 2692 high voltage cartridge fuse, sized to protect the equipment/load.

2120 VOLTAGE SENSING RELAYS:
- Provide single-phase inverse time undervoltage type voltage sensing relays to monitor the voltage between respective phases of supply.
- Mounting
  - Supply suitable for flush panel mounting with relay trip indication.
- Voltage settings
  - 50-90% in five equal steps with automatic resetting at 105% of voltage setting.
- Relay Inverse time characteristics
  - When voltage increases from zero to rated voltage with time multiplier set at 1.0, set relay resetting times as follows:

Relay settings %	50	60	70	80	90
Resetting time (secs)	2	4	5	10	12

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2130 TRIP/CLOSE SWITCHES AND CONTROL SELECTOR SWITCHES:
- Provide a panel mounted heavy duty, spring return trip/close switch on each circuit breaker fitted with solenoid or motorized spring closing mechanisms.
- Comply with BS EN 60947-3 and BS EN 60947-5-1 as relevant.
- Ensure contacts have a continuous rating for AC and DC currents of 10A minimum at between 30V to 250V, and make and break duty rating for AC and DC currents of 30A at 250V for a minimum period of 3 secs.
- Where remote trip/close control is indicated, supply a panel mounted selector switch to select circuit breaker for local or remote closing. Ensure that selection of remote or local closing does not prevent circuit breaker tripping under operation of local or remote trip switch.

2140 CURRENT TRANSFORMERS:

- Comply with BS EN 61869-2. Provide separate current transformers for each protection device and instrumentation. Ensure current transformers provide appropriate accuracy and are compatible with over current factors, characteristics, performance and VA rating required for satisfactory operation of protection devices, instruments and meters indicated.
- Ensure that current transformers are capable of withstanding maximum short time withstand current of value and duration indicated for assembly.
- Provide test links in secondary connections of all current transformers to facilitate testing of instruments, meters and protection devices.

2150A INSTRUMENTS AND METERS:

- Standards
  - Comply with BS 89 series, BS EN 60051-1 and BS EN 60051-5 for voltmeters, ammeters, watt meters, frequency indicators and power factor indicators.
  - For static electricity meters, comply with:
    - BS EN 62502-11 for general requirements, tests and test conditions
    - BS EN 62052-21 for Tariff and load control equipment
    - BS EN 62052-31 for product safety requirements and tests
    - BS EN 62053-61 for power consumption and voltage requirements
    - BS 7856, BS EN 50470-1, BS EN 50470-2, BS EN 62053-22 or BS EN 62053-21 for kWh meters, kVA and kW maximum demand meters and polyphase reactive kVA meters
    - BS EN 62053-23 or BS EN 62053-24 for kVAhr meters
  - For electromechanical meters for active energy, comply with BS EN 62053-11, BS EN 50470-1, BS EN 50470-3 and BS 7856
- Protect wiring to voltmeters by separate fuses.
- Protect potential coils of watt meters, frequency indicators, power factor indicators and kWh meters, kVA and kW maximum demand meters and polyphase reactive kVA meters by separate fuses.
- Supply instruments and meters suitable for flush mounting and type, size and accuracy as indicated.
- Ensure that indicating scales for all instruments comply with BS 3693.
- Supply so that normal indication is 50% to 75% of full scale deflection.
- Completely segregate all instruments in instrument compartments. Panel mount meters on front of instrument compartment.
- Provide instruments and meters with interface for communications with controllers.
  - RS 232C
  - BS EN 61968
  - BS EN 61850
  - Profibus BS EN 62769
  - Profinet BS EN 62769
  - Modbus.
  - Modbus over Ethernet.
  - "Wired" interfaces to BS EN 61131-2
    - Pulsed output device to BS EN 62053-31
    - Volt-free contacts
    - Contact voltageiven
      - Drive voltage
    - 4-20 mA analogue loop control output.
    - 4-20mA analogue loop instrumentation input.
    - 0-10V analogue voltage control output.
    - 0-10V analogue voltage instrumentation input.
  - Metering data
    - Relevant parts of BS EN 62056, BS EN IEC 62056 and PD IEC/TS 62056
    - PD CLC/TS 50568-4 and PD CLC/TS 50568-8
    - BS EN 61968-9
    - BS EN 50491-11
    - BS EN 13757 connectivity via:
      - Wired M-Bus.
      - Wireless M-Bus.
      - Public switched telephone network (PSTN).
      - Local area network.

- Wide area network.

2160A ELECTRICAL RECORDING INSTRUMENTS:
- Provide electrical recording instruments.
- Standard - BS EN 61143.

2170A INDICATOR LIGHTS:
- Supply lamps of same type throughout. Provide indicator lamps with lamp test facility.
- Lamps
  - Supply interchangeable indicators for respective units.
- Protect wiring to indicator lamp units by separate cartridge fuses.
- Lens Colour in accordance with BS EN 60073.

2180 LOW VOLTAGE COILS RATING:
- Ensure coils for switching relays, contactors and other applications are capable of withstanding inherent voltage drop within system without armature or switching apparatus dropping out of position.

2190A FRAMEWORK:
- Construct framework for supporting electrical equipment from mild steel plate and strip, cold and hot rolled steel sections or slotted angles, in accordance with BS EN 10210 and BS 4345 respectively. Comply with BS EN 1011-2 for metal arc welding.
- Finish
  - Frameworks mounted inside building manufacturer's standard finish.
  - Frameworks mounted outside building hot dip galvanized to BS EN ISO 1461.
- Supply cadmium or zinc electroplated bolts, nuts, washers and screws.

2200A FUSES:
- Supply cartridge fuse links including fuse carrier, bases and associated components that comply with BS 88 (BS EN 60269), fusing factor category gG, unless otherwise indicated.

2210A DISTRIBUTION BOARDS:
- Comply with BS EN 61439-3 as appropriate. Make internal separation Form 1 unless otherwise indicated. Make fuseboards fully shrouded. Fit each distribution board with an isolating switch. Install busbars in same position relative to their fuse carriers or miniature circuit-breakers (MCBs) for each pole. In TPN distribution boards supply neutral busbars with one outgoing terminal for each outgoing circuit.
- Provide a multi-terminal earthing bar for circuit protective conductors for both insulated and metal-cased boards, with one terminal for each outgoing circuit. Connect directly to earthing terminal without dependence on exposed conductive parts of enclosure.
- Identify each protective device by numbering. Identify each terminal on neutral busbar and earthing bar with its respective protective device.
- Where specific ratings are indicated incorporate fuses or MCBs, otherwise leave ways blank for future additions.
- Provide barrel type key lock to distribution board door.
- Enclosures finish
  - Finish - Manufacturer's standard.
  - Colour - Manufacturer's standard colour.

2220A CONSUMER UNITS:
- Comply with BS EN 61439-3 and BS EN 60529, IP31.
- Where a consumer unit or similar switchgear is to be installed in a dwelling, ensure that it is constructed

from, or installed in an enclosure that completely surrounds it that is constructed from, non-combustible material (metal), in accordance with BS 7671 (IET Wiring Regulations).

- Provide fuses or miniature circuit-breakers and means of isolation.
  - Provide barrel type key lock to consumer unit door.
  -

2230A MINIATURE CIRCUIT BREAKERS:

- Standard - BS EN 60898-1.
- Supply miniature circuit-breakers with voltage and current ratings, type according to instantaneous tripping current, energy limiting class, category of duty and frequency in accordance with BS EN 60898-1.

2240A RESIDUAL CURRENT DEVICE:

- Comply with BS EN 61008 or BS EN 62423. Supply residual current circuit breakers (RCCBs) with rated voltage, rated current, rated tripping current, rated tripping time and rated breaking capacity as indicated.
- DC component
  - Ensure DC component does not affect operation by selecting the residual current detection Type (AC, A, B or F) in accordance with BS 7671 (IET Wiring Regulations).
- Overcurrent protection
  - Fit RCDs with integral overcurrent protection.

2245 COMBINED RESIDUAL CURRENT/OVER CURRENT OPERATED CIRCUIT BREAKERS:

- Supply combined residual current/over current operated circuit breakers (RCBOs) in accordance with BS EN 61009.

2250 CABLE TERMINATIONS:

- Ensure that switchgear and distribution boards are provided with facilities to terminate size, number and type of cable indicated. Where necessary use fabricated steel extension boxes for glanding large and multiple cables.
- Provide non-ferrous metal glanding plates for single core cable terminations.

2260A FREE-STANDING, WALL-MOUNTED STATIC CAPACITOR:

- Standard - BS EN 61921.
- Voltage rating of capacitor - 400V, 3-phase, 50 Hz. Unit - Free-standing unit.
- Mounting - Wall mounting.
- Capacitor unit
  - Provide assembly housed in sheet steel enclosure complete with main terminals, comprising individual low loss, power capacitor elements and fuses to BS EN 60143-3 or BS EN 60871-4.
- Capacitor unit assembly
  - Incorporate thermal equalizers within assembly of elements.
  - Fill enclosure with inorganic, inert and non-flammable granules.
  - Fit discharge resistors.
  - Ensure all internal and external connections are adequately rated and fully insulated.
- Static capacitor enclosure
  - Material - Manufacturer's standard.
  - Colour - Manufacturer's standard.
  - Finish - Manufacturer's standard.
- Capacitor discharge devices - Manufacturer's standard.

2260B FREE-STANDING, FLOOR MOUNTED STATIC CAPACITOR:

- Standard - BS EN 61921.
- Voltage rating of capacitor - 400V, 3-phase, 50 Hz. Unit - free-standing unit

- Mounting - Floor mounting.
- Capacitor unit
  - Provide assembly housed in sheet steel enclosure complete with main terminals, comprising individual low loss, power capacitor elements and fuses to BS EN 60143-3 or BS EN 60871-4.
- Capacitor unit assembly
  - Incorporate thermal equalizers within assembly of elements.
  - Fill enclosure with inorganic, inert and non-flammable granules.
  - Fit discharge resistors.
  - Ensure all internal and external connections are adequately rated and fully insulated.
- Static capacitor enclosure
  - Material - Manufacturer's standard.
  - Colour - Manufacturer's standard.
  - Finish - Manufacturer's standard.
- Capacitor discharge devices - Manufacturer's standard.

2260C WALL-MOUNTED WITHIN SWITCHBOARD, STATIC CAPACITOR:
- Standard - BS EN 61921.
- Voltage rating of capacitor - 400V, 3-phase, 50 Hz. Unit - Within switchboard.
- Mounting - Wall mounting.
- Capacitor unit
  - Provide assembly housed in sheet steel enclosure complete with main terminals, comprising individual low loss, power capacitor elements and fuses to BS EN 60143-3 or BS EN 60871-4.
- Capacitor unit assembly
  - Incorporate thermal equalizers within assembly of elements.
  - Fill enclosure with inorganic, inert and non-flammable granules.
  - Fit discharge resistors.
  - Ensure all internal and external connections are adequately rated and fully insulated.
- Static capacitor enclosure
  - Material - Manufacturer's standard.
  - Colour - Manufacturer's standard.
  - Finish - Manufacturer's standard.
- Capacitor discharge devices - Manufacturer's standard.

2260D FLOOR MOUNTED WITHIN SWITCHBOARD, STATIC CAPACITOR:
- Standard - BS EN 61921.
- Voltage rating of capacitor - 400V, 3-phase, 50 Hz.
- Unit - Within switchboard.
- Mounting - Floor mounting.
- Capacitor unit
  - Provide assembly housed in sheet steel enclosure complete with main terminals, comprising individual low loss, power capacitor elements and fuses to BS EN 60143-3 or BS EN 60871-4.
- Capacitor unit assembly
  - Incorporate thermal equalizers within assembly of elements.
  - Fill enclosure with inorganic, inert and non-flammable granules.
  - Fit discharge resistors.
  - Ensure all internal and external connections are adequately rated and fully insulated.
- Static capacitor enclosure
  - Material - Manufacturer's standard.
  - Colour - Manufacturer's standard.
  - Finish - Manufacturer's standard.
- Capacitor discharge devices - Manufacturer's standard.

2270A FREE-STANDING, WALL-MOUNTED AUTOMATICALLY CONTROLLED CAPACITOR BANKS:
- Standard - BS EN 61921.
- Voltage rating of capacitor - 400V, 3-phase, 50 Hz.
- Bank unit

- Provide free-standing modular bank. Include in each module contactors, line fuses and control circuitry.
- Arrangement - Wall mounting.
- Switching - Block contactor switching.
- Control
  - Provide automatic control via an automatic multi-stage kVAr sensitive, solid state relay with stage switches to operate the capacitor contactors.
- Control relay
  - Incorporate relay into cubicle.
  - Fit relay with a loss of voltage no volt release re-setting feature to reset switching sequence to all contacts open position following failure of supply.
  - Provide visual indication by means of LED's for capacitor stages and capacitor/inductive load.
  - Provide Hand/Off/Auto selection switch.
- Isolator - Incorporate on load break isolator.
- Capacitor unit
  - Provide assembly housed in sheet steel enclosure complete with main terminals, comprising individual low loss, power capacitor elements and fuses to BS EN 60143-3 or BS EN 60871-4.
- Capacitor unit assembly
  - Incorporate thermal equalizers within assembly of elements.
  - Fill enclosure with inorganic, inert and non-flammable granules.
  - Fit discharge resistors.
  - Ensure all internal and external connections are adequately rated and fully insulated.
- Automatic bank enclosure
  - Material - Manufacturer's standard.
  - Finish and colour - Manufacturer's standard.
  - Access - Front access.
- Capacitor discharge devices - Manufacturer's standard.

2270B FREE-STANDING, FLOOR MOUNTED AUTOMATICALLY CONTROLLED CAPACITOR BANKS:
- Standard - BS EN 61921.
- Voltage rating of capacitor - 400V, 3-phase, 50 Hz.
- Bank unit
  - Provide free-standing modular bank. Include in each module contactors, line fuses and control circuitry.
- Arrangement - Floor mounting.
- Switching - Block contactor switching.
- Control
  - Provide automatic control via an automatic multi-stage kVAr sensitive, solid state relay with stage switches to operate the capacitor contactors.
- Control relay
  - Incorporate relay into cubicle.
  - Fit relay with a loss of voltage no volt release re-setting feature to reset switching sequence to all contacts open position following failure of supply.
  - Provide visual indication by means of LED's for capacitor stages and capacitor/inductive load.
  - Provide Hand/Off/Auto selection switch.
- Isolator - Incorporate on load break isolator.
- Capacitor unit
  - Provide assembly housed in sheet steel enclosure complete with main terminals, comprising individual low loss, power capacitor elements and fuses to BS EN 60143-3 or BS EN 60871-4.
- Capacitor unit assembly
  - Incorporate thermal equalizers within assembly of elements.
  - Fill enclosure with inorganic, inert and non-flammable granules.
  - Fit discharge resistors.
  - Ensure all internal and external connections are adequately rated and fully insulated.
- Automatic bank enclosure
  - Material - Manufacturer's standard.
  - Finish and colour - Manufacturer's standard.
  - Access - Front access.

- Capacitor discharge devices - Manufacturer's standard.

2270C WALL-MOUNTED WITHIN SWITCHBOARD, AUTOMATICALLY CONTROLLED CAPACITOR BANKS:
- Standard - BS EN 61921.
- Voltage rating of capacitor - 400V, 3-phase, 50 Hz.
- Bank unit
  - Provide modular bank within switchboard. Include in each module contactors, line fuses and control circuitry.
- Arrangement - Wall mounting.
- Switching - Block contactor switching.
- Control
  - Provide automatic control via an automatic multi-stage kVAr sensitive, solid state relay with stage switches to operate the capacitor contactors.
- Control relay
  - Incorporate relay into cubicle.
  - Fit relay with a loss of voltage no volt release re-setting feature to reset switching sequence to all contacts open position following failure of supply.
  - Provide visual indication by means of LED's for capacitor stages and capacitor/inductive load.
  - Provide Hand/Off/Auto selection switch.
- Isolator - Incorporate on load break isolator.
- Capacitor unit
  - Provide assembly housed in sheet steel enclosure complete with main terminals, comprising individual low loss, power capacitor elements and fuses to BS EN 60143-3 or BS EN 60871-4.
- Capacitor unit assembly
  - Incorporate thermal equalizers within assembly of elements.
  - Fill enclosure with inorganic, inert and non-flammable granules.
  - Fit discharge resistors.
  - Ensure all internal and external connections are adequately rated and fully insulated.
- Automatic bank enclosure
  - Material - Manufacturer's standard.
  - Finish and colour - Manufacturer's standard.
  - Access - Front access.
- Capacitor discharge devices - Manufacturer's standard.

2270D FLOOR MOUNTED WITHIN SWITCHBOARD, AUTOMATICALLY CONTROLLED CAPACITOR BANKS:
- Standard - BS EN 61921.
- Voltage rating of capacitor - 400V, 3-phase, 50 Hz.
- Bank unit
  - Provide modular bank within switchboard. Include in each module contactors, line fuses and control circuitry.
- Arrangement - Floor mounting.
- Switching - Block contactor switching.
- Control
  - Provide automatic control via an automatic multi-stage kVAr sensitive, solid state relay with stage switches to operate the capacitor contactors.
- Control relay
  - Incorporate relay into cubicle.
  - Fit relay with a loss of voltage no volt release re-setting feature to reset switching sequence to all contacts open position following failure of supply.
  - Provide visual indication by means of LED's for capacitor stages and capacitor/inductive load.
  - Provide Hand/Off/Auto selection switch.
- Isolator - Incorporate on load break isolator.
- Capacitor unit
  - Provide assembly housed in sheet steel enclosure complete with main terminals, comprising individual low loss, power capacitor elements and fuses to BS EN 60143-3 or BS EN 60871-4.

- Capacitor unit assembly
  - Incorporate thermal equalizers within assembly of elements.
  - Fill enclosure with inorganic, inert and non-flammable granules.
  - Fit discharge resistors.
  - Ensure all internal and external connections are adequately rated and fully insulated.
- Automatic bank enclosure
  - Material - Manufacturer's standard.
  - Finish and colour - Manufacturer's standard.
  - Access - Front access.
- Capacitor discharge devices - Manufacturer's standard.

2270E SINGLE CUBICLE WITHIN SWITCHBOARD, AUTOMATICALLY CONTROLLED CAPACITOR BANKS:
- Standard - BS EN 61921.
- Voltage rating of capacitor - 400V, 3-phase, 50 Hz.
- Bank unit
  - Provide modular bank within switchboard. Include in each module contactors, line fuses and control circuitry.
- Arrangement - Single cubicle.
- Switching - Block contactor switching.
- Control
  - Provide automatic control via an automatic multi-stage kVAr sensitive, solid state relay with stage switches to operate the capacitor contactors.
- Control relay
  - Incorporate relay into cubicle.
  - Fit relay with a loss of voltage no volt release re-setting feature to reset switching sequence to all contacts open position following failure of supply.
  - Provide visual indication by means of LED's for capacitor stages and capacitor/inductive load.
  - Provide Hand/Off/Auto selection switch.
- Isolator - Incorporate on load break isolator.
- Capacitor unit
  - Provide assembly housed in sheet steel enclosure complete with main terminals, comprising individual low loss, power capacitor elements and fuses to BS EN 60143-3 or BS EN 60871-4.
- Capacitor unit assembly
  - Incorporate thermal equalizers within assembly of elements.
  - Fill enclosure with inorganic, inert and non-flammable granules.
  - Fit discharge resistors.
  - Ensure all internal and external connections are adequately rated and fully insulated.
- Automatic bank enclosure
  - Material - Manufacturer's standard.
  - Finish and colour - Manufacturer's standard.
  - Access - Front access.
- Capacitor discharge devices - Manufacturer's standard.

2280A HARMONIC FILTER:
- Unit - Filter conditioning to meet G5/4.
- Mounting - Floor mounting. Built-in type.
- Cubicle
  - Incorporating IGBTs, capacitors, reactors, block contactors and control gear.
- Cable termination chamber
  - Mount cable termination chamber on side of cubicle with access through removable plates.

2290A MEDIUM VOLTAGE IRON CORE FILTER REACTOR:
- Provide 3-phase filter reactor in accordance with BS EN 60076 and relevant parts of BS EN 61558
- Reactor
  - Copper foil windings insulated between layers, impregnated under vacuum and in over pressure

conditions with polyester resin and dried in furnace temperature of 150°C.
  - Ensure iron core flux density is designed for indicated harmonic loading. Ensure that saturation does not occur at switch-in of filter network.
  - Provide insulation for continuous operation at ambient temperature up to 40°C, temperature class T40/E.
- Electrical connections
  - To copper bars in accordance with DIN 46206.

3000 WORKMANSHIP

3010 FIXING:
- Fix all equipment independently of wiring system. Use cadmium or zinc electroplated bolts, nuts, washers and screws.

3020 MOUNTING HEIGHT:
- Mount single items of equipment 1450mm above finished floor level to centre of equipment, unless otherwise indicated.
- Arrange groups of equipment, other than floor mounted assemblies, so that all parts of equipment requiring access for operation or maintenance are at least 500mm and no more than 2000mm above finished floor level, unless otherwise indicated.

3030 ACCESS:
- Ensure that clearance in front of switchgear and controlgear is not less than 1m, or as indicated.

3040A MARKING AND DRAWING:
- Number terminals, cables and component parts to correspond with manufacturer's certified drawings.

3050 CABLE TERMINATIONS:
- Terminate paper-insulated cable by means of switchboard manufacturer's standard compound filled cable boxes.
- Terminate PVC SWA PVC and MICS cables inside enclosure by securing cables to switchboard with glanding plates or glanding brackets; and outside enclosure with glanding plates or fabricated steel extension boxes.

3060A INSTALLATION AND COMMISSIONING:
- Install and commission switchgear and controlgear in accordance with the appropriate standard and the manufacturer's recommendations. Include CT Polarity check in commission tests.

BS APPENDIX

BS 88-3:2010
Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household or similar applications). Examples of standardized systems of fuses A to F.

BS 88-4:1988
Cartridge fuses for voltages up to and including 1000 V a.c. and 1500 V d.c. Part 4 Specification of supplementary requirements for fuse-links for the protection of semiconductor devices

BS 89-2:1990
Direct acting indicating analogue electrical measuring instruments and their accessories. Part 2 Specification for special requirements for ammeters and voltmeters

BS 89-3:1990
Direct acting indicating analogue electrical measuring instruments and their accessories. Part 3 Specification for special requirements for wattmeters and varmeters

BS 89-4:1990
Direct acting indicating analogue electrical measuring instruments and their accessories. Part 4 Specification for special requirements for frequency meters

BS 89-9:1990
Direct acting indicating analogue electrical measuring instruments and their accessories. Part 9 Recommended test methods

BS 2692-2:1956
Fuses for voltages exceeding 1000 V a.c. Part 2 Expulsion fuses

BS 3693:1992
Recommendations for design of scales and indexes on analogue indicating instruments

BS 4345:1968
Specification for slotted angles

BS 4800:2011
Schedule of paint colours for building purposes

BS 4921:1988
Specification for sheradised coatings on iron and steel

BS 7671:2018
Requirements for electrical installations. IET Wiring Regulations

BS 7856:2017
Specification for special design and other features of alternating current watthour meters for active energy for use in the UK (Accuracy Classes A and B)

BS EN 1011-2:2001
Welding. Recommendations for welding of metallic materials. Part 2 Arc welding of ferritic steels

BS EN 10143:2006
Continuously hot-dip coated steel sheet and strip. Tolerances on dimensions and shape

BS EN 10210-1:2006
Hot finished structural hollow sections of non-alloy and fine grain steels. Part 1 Technical delivery requirements

BS EN 10210-2:2006
Hot finished structural hollow sections of non-alloy and fine grain steels. Part 2 Tolerances, dimensions

and sectional properties

BS EN 10346:2015
Continuously hot-dip coated steel flat products for cold forming. Technical delivery conditions

BS EN 13757-1:2014
Communication systems for meters. Data exchange

BS EN 13757-2:2018
Communication systems for meters. Wired M-Bus communication

BS EN 13757-3:2018
Communication systems for and remote reading of meters. Dedicated application layer

BS EN 13757-4:2013
Communication systems for meters and remote reading of meters. Part 4 Wireless meter readout (Radio meter reading for operation in SRD bands)

BS EN 13757-5:2015
Communication systems for meters. Wireless M-Bus relaying

BS EN 13757-6:2015
Communication systems for meters. Local Bus

BS EN 13757-7:2018
Communication systems for meters. Transport and security services

BS EN 50470-1:2006
Electricity metering equipment (a.c.). General requirements, tests and test conditions. Metering equipment (class indexes A, B and C)

BS EN 50470-2:2006
Electricity metering equipment (a.c.). Particular requirements. Electromechanical meters for active energy (class indexes A and B)

BS EN 50470-3:2006
Electricity metering equipment (a.c.). Particular requirements. Static meters for active energy (class indexes A, B and C)

BS EN 50491-11:2015
General requirements for Home and Building Electronic Systems (HBES) and Building Automation and Control Systems (BACS). Smart Metering. Application Specifications. Simple External Consumer Display

BS EN 60038:2011
CENELEC standard voltages

BS EN 60051-1:2017
Direct acting indicating analogue electrical measuring instruments and their accessories. Definitions and general requirements common to all parts.

BS EN 60073:2002
Basic and safety principles for man-machine interface, marking and identification. Coding principles for indicators and actuators

BS EN 60076-1:2011
Power transformers. Part 1 General

BS EN 60076-2:2011
Power transformers. Temperature rise for liquid-immersed transformers

BS EN 60076-3:2013+A1:2018
Power transformers. Part 3 Insulation levels, dielectric tests and external clearances in air

BS EN 60076-4:2002
Power transformers. Part 4 Guide to the lightning impulse and switching impulse testing. Power transformers and reactors

BS EN 60076-5:2006
Power transformers. Part 5 Ability to withstand short circuit

BS EN 60076-6:2008
Power transformers. Reactors

BS EN 60076-10:2016
Power transformers. Part 10 Determination of sound levels

BS EN 60076-11:2004
Power transformers. Part 11 Dry-type transformers

BS EN 60076-13:2006
Power transformers. Self-protected liquid-filled transformers

BS EN 60076-14:2013
Power transformers. Liquid-immersed power transformers using high-temperature insulation materials

BS EN 60076-16:2011
Power transformers. Transformers for wind turbines applications

BS EN 60076-18:2012
Power transformers. Measurement of frequency response

BS EN 60076-19:2015
Power transformers. Rules for the determination of uncertainties in the measurement of the losses on

power transformers and reactors

BS EN 60110-1:1998
Power capacitors for induction heating installations. Part 1 General

BS EN 60143-1:2015
Series capacitors for power systems. Part 1 General

BS EN 60143-2:2013
Series capacitors for power systems. Part 2 Protective equipment for series capacitor banks

BS EN 60143-3:2015
Series capacitors for power systems. Part 3 Internal fuses

BS EN 60143-3:2015
Series capacitors for power systems. Part 3 Internal fuses

BS EN 60143-4:2010
Series capacitors for power systems. Thyristors controlled series capacitors.

BS EN 60269-1:2007+A2:2014
Low-voltage fuses. Part 1 General requirements

BS EN 60269-4:2009+A2:2016
Low-voltage fuses. Part 4 Supplementary requirements for fuse-links for the protection of semiconductor devices

BS EN 60269-6:2011
Low-voltage fuses. Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems

BS EN 60529:1992+A2:2013
Degrees of protection provided by enclosures (IP code)

BS EN 60715:2017
Dimensions of low-voltage switchgear and controlgear. Standardized mounting on rails for mechanical support of switchgear, controlgear and accessories.

BS EN 60831-1:2014
Shunt power capacitors of the self-healing type for a.c. systems having a rated voltage up to and including 1 000 V. General. Performance, testing and rating. Safety requirements. Guide for installation and operation

BS EN 60831-1:2014
Shunt power capacitors of the self-healing type for a.c. systems having a rated voltage up to and including 1 000 V. General. Performance, testing and rating. Safety requirements. Guide for installation and operation

BS EN 60831-2:2014
Shunt power capacitors of the self-healing type for a.c. systems having a rated voltage up to and including 1 000 V. Ageing test, self-healing test and destruction test

BS EN 60831-2:2014
Shunt power capacitors of the self-healing type for a.c. systems having a rated voltage up to and including 1 000 V. Ageing test, self-healing test and destruction test

BS EN 60871-1:2014
Shunt capacitors for a.c. power systems having a rated voltage above 1 000 V. General

BS EN 60871-4:2014
Shunt capacitors for AC power systems having a rated voltage above 1000 V. Internal fuses

BS EN 60871-4:2014
Shunt capacitors for AC power systems having a rated voltage above 1000 V. Internal fuses

BS EN 60898-1:2003+A13:2012
Electrical accessories. Circuit-breakers for overcurrent protection for household and similar installations. Part 1 Circuit-breakers for a.c. operation

BS EN 60931-1:1998, IEC 60931-1:1996
Shunt power capacitors of the non-self-healing type for a.c. systems having a rated voltage up to and including 1000 V. Part 1 General. Performance, testing and rating. Safety requirements. Guide for installation and operation

BS EN 60931-2:1996, IEC 60931-2:1996
Shunt power capacitors of the non-self-healing type for a.c. systems having a rated voltage up to and including 1000 V. Part 2 Ageing test and destruction test

BS EN 60931-3:1997, IEC 60931-3:1996
Shunt power capacitors of the non-self-healing type for a.c. systems having a rated voltage up to and including 1000 V. Part 3 Internal fuses

BS EN 60934:2001+A2:2013
Circuit-breakers for equipment (CBE)

BS EN 60947-1:2007+A2:2014
Low-voltage switchgear and controlgear. Part 1 General rules

BS EN 60947-2:2017
Low-voltage switchgear and controlgear. Part 2 Circuit-breakers

BS EN 60947-2:2017
Low-voltage switchgear and controlgear. Part 2 Circuit-breakers

BS EN 60947-3:2009+A2:2015

Low-voltage switchgear and controlgear. Part 3 Switches, disconnectors, switch-disconnectors and fuse-combination units

BS EN 60947-3:2009+A2:2015
Low-voltage switchgear and controlgear. Part 3 Switches, disconnectors, switch-disconnectors and fuse-combination units

BS EN 60947-4-1:2010+A1:2012
Low-voltage switchgear and controlgear. Part 4-1 Contactors and motor-starters. Electromechanical contactors and motor-starters

BS EN 60947-4-2:2012
Low-voltage switchgear and controlgear. Part 4-2 Contactors and motor-starters. A.C. semiconductor motor controllers and starters

BS EN 60947-4-3:2014
Low-voltage switchgear and controlgear. Contactors and motor-starters. AC semiconductor controllers and contactors for non-motor loads

BS EN 60947-5-1:2017
Specification for low-voltage switchgear and controlgear. Part 5-1 Control/circuit devices and switching elements. Electromechanical control circuit devices

BS EN 60947-5-1:2017
Specification for low-voltage switchgear and controlgear. Part 5-1 Control/circuit devices and switching elements. Electromechanical control circuit devices

BS EN 60947-5-2:2007+A1:2012
Low-voltage switchgear and controlgear. Control circuit devices and switching elements. Proximity switches

BS EN 60947-5-3:2013
Low-voltage switchgear and controlgear. Control circuit devices and switching elements. Requirements for proximity devices with defined behaviour under fault conditions (PDDB)

BS EN 60947-5-4:2003
Specification for low-voltage switchgear and controlgear. Part 5-4 Control circuit devices and switching elements. Method of assessing the performance of low-energy contacts. Special tests

BS EN 60947-5-5:1998+A2:2017
Low-voltage switchgear and controlgear. Part 5-5: Control circuit devices and switching elements - Electrical emergency stop device with mechanical latching function

BS EN 60947-5-6:2001
Specification for low-voltage switchgear and controlgear. Control circuit devices and switching elements. DC interface for proximity sensors and switching amplifiers (NAMUR). DC interface for proximity sensors and switching amplifiers (NAMUR)

BS EN 60947-5-7:2003

Specification for low-voltage switchgear and controlgear. Control circuit devices and switching elements. Requirements for proximity devices with analogue output

BS EN 60947-5-8:2006
Low-voltage switchgear and controlgear. Control circuit devices and switching elements. Three-position enabling switches

BS EN 60947-5-9:2007
Low-voltage switchgear and controlgear. Control circuit devices and switching elements. Flow rate switches

BS EN 60947-6-1:2005+A1:2014
Low-voltage switchgear and controlgear. Multiple function equipment. Transfer switching equipment

BS EN 60947-6-2:2003
Specification for low-voltage switchgear and controlgear. Part 6-2 Multiple function equipment. Control and protective switching devices (or equipment) (CPS)

BS EN 60947-7-1:2009
Low-voltage switchgear and controlgear. Ancillary equipment. Terminal blocks for copper conductors

BS EN 60947-7-2:2009
Low-voltage switchgear and controlgear. Ancillary equipment. Protective conductor terminal blocks for copper conductors

BS EN 60947-7-3:2009
Low-voltage switchgear and controlgear. Ancillary equipment. Safety requirements for fuse terminal blocks

BS EN 60947-7-4:2013
Low-voltage switchgear and controlgear. Ancillary equipment. PCB terminal blocks for copper conductors

BS EN 60947-8:2003+A2:2012
Specification for low-voltage switchgear and controlgear. Part 8 Control units for built-in thermal protection (PTC) for rotating electrical machines

BS EN 61008-1:2012+A12:2017
Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs). General rules

BS EN 61008-2-1:1995
Specification for residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs). Part 2-1 Applicability of the general rules to RCCBs functionally independent of line voltage

BS EN 61009-1:2012+A12:2016
Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBO's). Part 1 General rules

BS EN 61009-2-1:1995
Specification for residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs). Part 2-1 Applicability of the general rules to RCBOs functionally independent of line voltage

BS EN 61082-1:2015
Preparation of documents used in electrotechnology. Part 1 Rules

BS EN 61131-2:2007
Programmable controllers. Part 2 Equipment requirements and tests

BS EN 61143-1:1994
Specification for electrical measuring instruments. X-t recorders. Part 1 Definitions and requirements

BS EN 61143-2:1994
Specification for electrical measuring instruments. Part 2 X-t recorders. Recommended additional test methods

BS EN 61439-1:2011
Low-voltage switchgear and controlgear assemblies. Part 1 General rules

BS EN 61439-1:2011
Low-voltage switchgear and controlgear assemblies. Part 1 General rules

BS EN 61439-2:2011
Low-voltage switchgear and controlgear assemblies. Power switchgear and controlgear assemblies

BS EN 61439-2:2011
Low-voltage switchgear and controlgear assemblies. Power switchgear and controlgear assemblies

BS EN 61439-3:2012
Low-voltage switchgear and controlgear assemblies. Distribution boards intended to be operated by ordinary persons (DBO)

BS EN 61439-4:2013
Low-voltage switchgear and controlgear assemblies. Particular requirements for assemblies for construction sites (ACS)

BS EN 61439-5:2015
Low-voltage switchgear and controlgear assemblies. Assemblies for power distribution in public networks

BS EN 61439-6:2012
Low-voltage switchgear and controlgear assemblies. Busbar trunking systems (busways)

BS EN 61558-1:2005+A1:2009
Safety of power transformers, power supplies, reactors and similar products. Part 1 General requirements and tests

BS EN 61558-2-1:2007
Safety of power transformers, power supplies, reactors and similar products. Part 2-1 Particular requirements and tests for separating transformers and power supplies incorporating separating transformers for general applications

BS EN 61558-2-2:2007
Safety of power transformers, power supplies, reactors and similar products. Part 2-2 Particular requirements and tests for control transformers and power supplies incorporating control transformers

BS EN 61558-2-3:2010
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for ignition transformers for gas and oil burners

BS EN 61558-2-4:2009
Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V. Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers

BS EN 61558-2-5:2010
Safety of transformers, reactors, power supply units and combinations thereof. Part 2-5 Particular requirements and tests for transformer for shavers, power supply units for shavers and shaver supply units

BS EN 61558-2-6:2009
Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V. Part 2-6 Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers

BS EN 61558-2-8:2010
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for transformers and power supply units for bells and chimes

BS EN 61558-2-9:2011
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for transformers and power supply units for class III handlamps for tungsten filament lamps

BS EN 61558-2-10:2014
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for separating transformers with high insulation level and separating transformers with output voltages exceeding 1 000 V

BS EN 61558-2-12:2011
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for constant voltage transformers and power supply units for constant voltage

BS EN 61558-2-13:2009
Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V. Particular requirements and tests for auto transformers and power supply units incorporating auto transformers

BS EN 61558-2-14:2013
Safety of transformers, reactors, power supply units and combination thereof. Particular requirements and tests for variable transformers and power supply units incorporating variable transformers

BS EN 61558-2-15:2012
Safety of transformers, reactors, power supply units and combinations thereof. Part 2-15 Particular requirements and tests for isolating transformers for the supply of medical locations

BS EN 61558-2-16:2009+A1:2013
Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V. Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units

BS EN 61558-2-20:2011
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for small reactors

BS EN 61558-2-23:2010
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for transformers and power supply units for construction sites

BS EN 61558-2-26:2013
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for transformers and power supply units for saving energy and other purposes

BS EN 61810-1:2015
Electromechanical elementary relays. General and safety requirements

BS EN 61810-2-1:2017
Electromechanical elementary relays. Reliability. Procedure for the verification of B10 values

BS EN 61810-2:2017
Electromechanical elementary relays. Reliability

BS EN 61810-3:2015
Electromechanical elementary relays. Relays with forcibly guided (mechanically linked) contacts

BS EN 61810-7:2006
Electromechanical elementary relays. Test and measurement procedures

BS EN 61850-3:2014
Communication networks and systems for power utility automation. General requirements

BS EN 61850-4:2011
Communication networks and systems for power utility automation. System and project management

BS EN 61850-5:2013
Communication networks and systems for power utility automation. Communication requirements for functions and device models

BS EN 61850-6:2010
Communication networks and systems for power utility automation. Configuration description language for communication in electrical substations related to IEDs

BS EN 61850-7-1:2011
Communication networks and systems for power utility automation. Basic communication structure. Principles and models

BS EN 61850-7-2:2010
Communication networks and systems for power utility automation. Basic information and communication structure. Abstract communication service interface (ACSI)

BS EN 61850-7-3:2011
Communication networks and systems for power utility automation. Basic communication structure. Common data classes

BS EN 61850-7-4:2010
Communication networks and systems for power utility automation. Basic communication structure. Compatible logical node classes and data object classes

BS EN 61850-7-410:2013+A1:2016
Communication networks and systems for power utility automation. Basic communication structure. Hydroelectric power plants. Communication for monitoring and control

BS EN 61850-7-420:2009
Communication networks and systems for power utility automation. Basic communication structure. Distributed energy resources logical nodes

BS EN 61850-8-1:2011
Communication networks and systems for power utility automation. Specific communication service mapping (SCSM). Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3

BS EN 61850-10:2013
Communication networks and systems for power utility automation. Conformance testing

BS EN 61869-2:2012
Instrument transformers. Additional requirements for current transformers

BS EN 61921:2003
Power capacitors. Low-voltage power factor correction banks

BS EN 61968-1:2013
Application integration at electric utilities. System interfaces for distribution management. Interface architecture and general recommendations

BS EN 61968-4:2007
Application integration at electric utilities. System interfaces for distribution management. Interfaces for records and asset management

BS EN 61968-6:2016
Application integration at electric utilities. System interfaces for distribution management. Interfaces for maintenance and construction

BS EN 61968-8:2016
Application integration at electric utilities. System interfaces for distribution management. Interfaces for customer operations

BS EN 61968-9:2014
Application integration at electric utilities. System interfaces for distribution management. Interfaces for meter reading and control

BS EN 61968-11:2013
Application integration at electric utilities. System interfaces for distribution management. Common information model (CIM) extensions for distribution

BS EN 61968-13:2008
Application integration at electric utilities. System interfaces for distribution management. CIM RDF Model exchange format for distribution

BS EN 61968-100:2013
Application integration at electric utilities. System interfaces for distribution management. Implementation profiles

BS EN 62052-11:2003+A1:2017
Electricity metering equipment (AC). Part 11 General requirements, tests and test conditions. Metering equipment

BS EN 62052-21:2004+A1:2017
Electricity metering equipment (a.c.). General requirements, tests and test conditions. Tariff and load control equipment

BS EN 62052-31:2016
Electricity metering equipment (AC). General requirements, tests and test conditions. Product safety requirements and tests

BS EN 62053-11:2003+A1:2017
Electricity metering equipment (a.c.). Part 11 Particular requirements. Electromechanical meters for active energy (classes 0,5, 1 and 2)

BS EN 62053-21:2003+A1:2017
Electricity metering equipment (a.c.). Particular requirements. Part 21 Static meters for active energy (classes 1 and 2)

BS EN 62053-22:2003+A1:2017
Electricity metering equipment (a.c.). Part 22 Particular requirements. Static meters for active energy (classes 0,2 S and 0,5 S)

BS EN 62053-23:2003+A1:2017
Electricity metering equipment (a.c.). Particular requirements. Part 23 Static meters for reactive energy (classes 2 and 3)

BS EN 62053-24:2015+A1:2017
Electricity metering equipment (a.c.). Particular requirements. Static meters for reactive energy at fundamental frequency (classes 0,5 S, 1 S and 1)

BS EN 62053-31:1999, IEC 62053-31:1998
Electricity metering equipment (a.c.). Particular requirements. Pulse output devices for electromechanical and electronic meters (two wires only)

BS EN 62053-61:1999
Electricity metering equipment (a.c.). Particular requirements. Power consumption and voltage requirements

BS EN 62054-21:2004+A1:2017
Electricity metering (AC). Tariff and load control. Part 21 Particular requirements for time switches

BS EN 62056-1-0:2015
Electricity metering data exchange. The DLMS/COSEM suite. Smart metering standardization framework

BS EN 62056-3-1:2014
Electricity metering data exchange. The DLMS/COSEM suite. Use of local area networks on twisted pair with carrier signalling

BS EN 62056-4-7:2016
Electricity metering data exchange. The DLMS/COSEM suite. DLMS/COSEM transport layer for IP networks

BS EN 62056-5-3:2017
Electricity metering data exchange. The DLMS/COSEM suite. DLMS/COSEM application layer

BS EN 62056-6-1:2017
Electricity metering data exchange. The DLMS/COSEM suite. Object Identification System (OBIS)

BS EN 62056-7-3:2017
Electricity metering data exchange. The DLMS/COSEM suite. Wired and wireless M-Bus communication profiles for local and neighbourhood networks

BS EN 62056-7-5:2016
Electricity metering data exchange. The DLMS/COSEM suite. Local data transmission profiles for Local Networks (LN)

BS EN 62056-7-6:2013
Electricity metering data exchange. The DLMS/COSEM suite. The 3-layer, connection-oriented HDLC based communication profile

BS EN 62056-8-3:2013
Electricity metering data exchange. The DLMS/COSEM suite. Communication profile for PLC S-FSK neighbourhood networks

BS EN 62056-8-5:2017
Electricity metering data exchange. The DLMS/COSEM suite. Narrow-band OFDM G3-PLC communication profile for neighbourhood networks

BS EN 62056-8-6:2017
Electricity metering data exchange. The DLMS/COSEM suite. High speed PLC ISO/IEC 12139-1 profile for neighbourhood networks

BS EN 62056-9-7:2013
Electricity metering data exchange. The DLMS/COSEM suite. Communication profile for TCP-UDP/IP networks

BS EN 62056-21:2002
Electricity metering. Data exchange for meter reading, tariff and load control. Direct local data exchange

BS EN 62056-42:2002, IEC 62056-42:2002
Electricity metering. Data exchange for meter reading, tariff and load control. Physical layer services and procedures for connection-oriented asynchronous data exchange

BS EN 62056-46:2002
Electricity metering. Data exchange for meter reading, tariff and load control. Data link layer using HDLC protocol

BS EN 62056-53:2007
Electricity metering. Data exchange for meter reading, tariff and load control. COSEM application layer

BS EN 62208:2011
Empty enclosures for low-voltage switchgear and controlgear assemblies. General requirements

BS EN 62262:2002
Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)

BS EN 62423:2012
Type F and type B residual current operated circuit-breakers with and without integral overcurrent protection for household and similar uses

BS EN 62606:2013+A1:2017
General requirements for arc fault detection devices

BS EN 62626-1:2014
Low-voltage switchgear and controlgear enclosed equipment. Enclosed switch-disconnectors outside the scope of IEC 60947-3 to provide isolation during repair and maintenance work

BS EN 62769-1:2015
Field device integration (FDI). Overview

BS EN 62769-2:2015
Field Device Integration (FDI). FDI Client

BS EN 62769-3:2015
Devices and integration in enterprise systems; Field Device Integration. FDI Server

BS EN 62769-4:2015
Field Device Integration (FDI). FDI Packages

BS EN 62769-5:2015
Field Device Integration (FDI). FDI Information Model

BS EN 62769-6:2015
Field Device Integration (FDI). FDI Technology Mapping

BS EN 62769-7:2015
Field Device Integration (FDI). FDI Communication Devices

BS EN 62769-101-1:2015
Field Device Integration (FDI). Profiles. Foundation Fieldbus H1

BS EN 62769-101-2:2015
Field Device Integration (FDI). Profiles. Foundation Fieldbus HSE

BS EN 62769-103-1:2015
Field Device Integration (FDI). Profiles. PROFIBUS

BS EN 62769-103-4:2015
Field Device Integration (FDI). Profiles. PROFINET

BS EN 62769-109-1:2015
Field Device Integration (FDI). Profiles. HART(r) and WirelessHART(r)

BS EN ISO 1461:2009
Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods

BS IEC 1008-2-2:1990
Specification for residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCCBs). Applicability of the general rules to RCCBs functionally dependent on line voltage

Y72 CONTACTORS AND STARTERS

1010A 3-PHASE SUPPLY:
- Ensure all electrical equipment supplied and installed is suitable for 3-phase power supply to BS EN 60038.

1010B SINGLE-PHASE ELECTRICAL SUPPLY:
- Ensure all electrical equipment supplied and installed is suitable for single-phase power supply to BS EN 60038.

1010C 3-PHASE AND NEUTRAL SUPPLY:
- Ensure all electrical equipment supplied and installed is suitable for 3-phase and neutral power supply to BS EN 60038

1020A MANUFACTURER FITTED SURGE SUPPRESSORS:
- Supply surge suppressors to star connected motors and to all motors subject to star-delta starting to limit peak voltage to 1200 volts. Fitted by Manufacturer.

1020B INSTALLER FITTED SURGE SUPPRESSORS:
- Supply surge suppressors to star connected motors and to all motors subject to star-delta starting to limit peak voltage to 1200 volts. Fitted by installer.

1030A MANUFACTURER FITTED TRANSIENT SUPPRESSORS:
- Supply transient suppressors in the form of resistor and capacitor networks across the starter contactor coils. Fitted by Manufacturer.

1030B INSTALLER FITTED TRANSIENT SUPPRESSORS:
- Supply transient suppressors in the form of resistor and capacitor networks across the starter contactor coils. Fitted by installer.

2000 PRODUCTS/MATERIALS

2010A CONTROLGEAR ASSEMBLY:
- Standard
  - BS EN 61439-1.
  - BS EN 61439-2.
- External design - Cubicle type assembly.
- Usage - Control panel, Motor Control Centre (MCC) or single starter enclosure.
- Conditions of installation - Indoors.
- Electrical characteristics
  - Rated operational voltage, 400 V. Rated short-time withstand current, 20 times rated current.
  - Service conditions - Ambient air temperature and altitude to relevant parts of BS EN 61439.

2020A ASSEMBLY CONSTRUCTION:
- Enclosure standard - BS EN 62208.
- Material of enclosure - Manufacturer's standard.
- Terminals for external conductors, main power circuits
  - Accommodate cross-sectional area of copper cables in accordance with relevant parts of BS EN 61439.

- Terminals for external conductor, control and auxiliary circuits
  - Terminal block. Mounting - top hat rails dimensional type TH 35-7,5 to BS EN 60715. Steel rails to be manufactured and finished in accordance with Appendix A to BS EN 60715.
  - Size of neutrals on 3-phase supplies
  - Full current-carrying capacity of phase conductor.
- Degree of protection to BS EN 60529
  - IP31 for units installed inside buildings excluding boiler rooms and pump rooms.
  - IP55 for units installed in boiler rooms, pump rooms and outside buildings.
- Protection against direct and indirect contact as Manufacturer's standard.
- Accessibility for inspection
  - Arrange for following operations to be performed when assembly is in service and under voltage.
  - Visual inspection of switching devices and other apparatus; settings and indicators of relays and releases; conductor connections and markings.
  - Adjusting and re-setting of relays, releases and electronic devices.
  - Replacement of fusel inks and indicating lamps.
  - Fault location by voltage and current measuring.
- Accessibility for maintenance
  - Provide space between functional unit or group and adjacent functional units or groups. Provide retainable fastening means for parts likely to be removed for maintenance.
  - Use barrier protected sub-sections for each functional unit or group.
  - Use compartments for each functional unit or group.
- Removable parts and withdrawable parts
  - Degree of protection of assembly after removal or withdrawal of part as manufacturer's standard.
- Internal separation - Manufacturer's standard.
- Input voltage variations for electronic equipment supply - relevant parts of BS EN 61439.
- Supply frequency deviation - relevant parts of BS EN 61439.
- Mounting - Floor standing or wall-mounted.

2030A ENCLOSURE FINISH:

- Apply high standard finish to enclosure and supporting metalwork. Degrease metal and remove rust prior to applying finish.
- Comply with paint manufacturer's recommendations regarding preparation, stoving times, temperatures, mixing of finishes, application and coat thickness.
- Finish - Manufacturer's standard.
- Colour - Manufacturer's standard colour.

2040 SITE MODIFICATION:

- Do not make site alterations unless authorised. Where site modifications to assemblies are authorised make in accordance with manufacturer's certified drawings and instructions. Ensure that modifications made comply with type test certificate obtained for arrangement of components.

2050C CONTINUOUS LV CONTACTORS AND MOTOR STARTERS:

- Standard
  - BS EN 60947-4-1
  - BS EN 60947-4-2
  - BS EN 60947-4-3
  - BS EN 62626-1
- Type of equipment - AC mechanical contactor. Interrupting medium, air.
  - Operating condition.
    - Method of operation - Electromagnetic.
    - Method of control - Automatic.
- Rated and limiting values for the main circuit.
  - Rated voltage (Volts) - Operational, 400.
  - Rated duty - Continuous.
  - Operational performance.
    - One rotation direction, with motor stopping between operations.

- Control circuits
  - Electrical - AC; rated frequency (Hertz), 50; rated voltage (Volts), 230.
- Co-ordination with short-circuit protective devices - Type1
- Enclosure degree of protection to BS EN 60529, IP31, or IP65 where BS EN 62626-1 applies.
- Minimum mechanical and electrical endurance
  - Mechanical 0.3 million; electrical 15,000.
- Provide mechanical and electrical interlocks to prevent simultaneous closure of paired contactors.

2060A CONTROL CIRCUIT DEVICES:
- Standard
  - BS EN 60947-5-1
- Type of equipment.
  - AC control circuit device
  - Manual control switches; emergency stop; control relays; pilot switches; position switches; associated equipment; auxiliary contacts and indicating lamps.
  - Interrupting medium, Air.
  - Operating condition.
    - Method of operation - electromagnetic.
    - Method of control - automatic.
- Rated and limiting values for the main circuit.
  - Rated voltage (Volts) - operational, 230.
  - Rated frequency (Hertz), 50.
  - Contact element classification.
  - Enclosure degree of protection IP31.

2070A ISOLATING SWITCHES:
- Standard
  - BS EN 60947-3.
  - BS EN 62626-1
- Provide independent manual operation type isolating switches with rated duty, rated operational current and utilization category compatible with contactor.

2080A CONTROL SELECTOR SWITCHES:
- Standard
  - BS EN 60947-5-1
  - BS EN 62626-1
- Provide panel mounting independent manual operation rotary type switch to select local/off/remote control.
- Ensure switch rated thermal current, rated operational current, and utilization category are compatible with contactor control circuit characteristics and circuit protection device.

2090A IN-BUILT PUSH BUTTONS:
- Provide panel mounting type push buttons with actuator colours to BS EN 60073.
- Standard
  - BS EN 60947-5-1.
- Pattern
  - Supply flush button type start/on and reset push buttons. Supply mushroom actuator type stop/off push buttons released by turning the actuator.
- Ensure rated thermal current, rated operational current and utilization category of push button contacts are compatible with contactor control circuit characteristics and circuit protection device.

2100A INDICATOR LIGHTS:
- Supply lamps of same type throughout. Provide indicator lamps with lamp test facility.
- Standard

- BS EN 842
- BS EN 60947-5-1.

- Details
  - Supply interchangeable indicators for respective units. Provide neon indicators. Provide 230V indicator circuits and lamps.
- Protect wiring to indicator lamp units by separate cartridge fuses.
- Lens colour - In accordance with BS EN 60073.

2110A CONTACTOR CONTROL RELAYS:

- Standard BS EN 60947-5-1, install relays in contactor enclosure.
- Relay enclosure protection to BS EN 60529
  - Compatible with contactor enclosure.

2120A CONTROL AND INDICATOR LIGHT CIRCUIT FUSES:

- Provide in contactor enclosure separate low voltage fuse bases, fuse carriers and cartridge fuses for protection of control circuits and indicator light circuits.
- Fuses
  - Fully shrouded impact resistant moulded plastic fuse bases and carriers in accordance with BS 88 (BS EN 60269).

2130A MOTOR STARTERS - MOTORS BELOW 0.37 KW:

- Provide fuses or circuit breakers for motors below 0.37 kW.
- Provide isolation during repair and maintenance work in accordance with BS EN 62626-1

2130B MOTOR STARTERS - MOTORS OF 0.37KW AND ABOVE:

- Provide starters incorporating overcurrent protection for motors of 0.37kW and above.
  - Provide starter with manual reset, adjustable, inverse time delay, and ambient temperature compensated thermal overcurrent release to BS EN 60947-4-1. Ensure overcurrent release is compatible with starting, accelerating and running characteristics of motor, starter and driven machine combination. Use phase unbalance protection on 3-phase equipment.
- Provide isolation during repair and maintenance work in accordance with BS EN 62626-1

2150 DIRECT-ON-LINE MOTOR STARTERS:

- Use direct-on-line starter to BS EN 60947-4-1, with single-phase motors and 3-phase motors.
- Provide isolation during repair and maintenance work in accordance with BS EN 62626-1

2160 STAR DELTA MOTOR STARTERS:

- Use star delta starter to BS EN 60947-4-1 with 3-phase motors.
- Provide isolation during repair and maintenance work in accordance with BS EN 62626-1
- Incorporate adjustable time delay contactor relays, to control star delta changeover, ensuring electrical endurance compatible with starter contactors. Ensure starting sequence activated on voltage restoration.

2190A VARIABLE SPEED MOTOR DRIVES - LOCATED IN LOCAL CONTROL PANEL OR EXPOSED WALL OR FRAME MOUNTED:

- Supply VSD's tailor made for HVAC application with two built in PID controllers, built in HVAC application macros and real-time clock and calendar to control speed of standard AC squirrel cage motors.
- VSD type - digital Pulse Width Modulation PWM.
- Location - control panel.

- Control range - 0.5 to 120 Hz.
- Power factor - 0.97 lagging or better.
- Starting current - not to exceed 1 x FLC.
- Provide integrated, lockable incoming mains isolation switch.
- Characteristics
  - Ensure acceleration and deceleration ramps are independently adjustable
  - Allow connection to a turning motor without braking to a standstill
  - Allow connection to a reverse windmilling fan without causing tripping and return fan to correct speed. Ensure VSD's require no additional means for starting. Supply VSD's that do not require electrical matching to motor. Ensure VSD's are capable of running motors in parallel
  - EMC characteristics to BS EN IEC 61800-3, Category C2
- Standards
  - Comply with relevant parts of BS EN 60204 for safety of electrical equipment
  - Comply with relevant parts of BS EN IEC 61800
  - Comply with relevant parts of BS EN 60068 for environmental testing
- Harmonics
  - Comply with BS EN 61000-3-12
  - Incorporate facilities into the drive to minimise harmonics generated at partial loads to ENA Engineering recommendation G5/4-1 limits
- Mains interruption
  - Ensure VSD does not cause tripping through a mains interruption of 200 msec.
- Protection
  - Ensure VSD incorporates the following protection to cause electronic shut down without operating circuit protective devices
  - Motor phase to phase fault; motor phase to earth fault; overvoltage; undervoltage; inverter overheat; motor overheat; loss of control signal; loss of auxiliary control voltage; current limit
- VSD controls - local/remote facility to be provided where appropriate for operational and maintenance use.
- Display
  - Make provision for inverter to display externally, external and internal faults following a failure.
  - Show 1st, 2nd and 3rd up sequential faults
  - Provide digital readout to show output frequency Hz; reference 1 (Hand); reference 2 (Auto); motor current (% or Amps); fault memory
  - Provide volt free remote signalling contacts to indicate common fault; running/stopped conditions; healthy/tripped conditions
  - Ensure parameters can be set and fault memory interrogated with door closed, and without additional instrumentation
- Mounting
  - Wall mount vertically in accordance with the manufacturer's recommendations or mount within a control panel cabinet in accordance with the manufacturer's recommendations.
- Cooling
  - Ensure the free space around the drive is in accordance with the manufacturer's recommendations for ventilation and maintenance.
  - When installing a VSD in a control panel cabinet, provide ventilation openings and if required cooling fans in the cabinet to ensure air cannot be recirculated such that the cooling air does not exceed the unit ambient maximum operating temperature.
- Provide isolation during repair and maintenance work in accordance with BS EN 62626-1

2190B VARIABLE SPEED MOTOR DRIVES (LOCATED IN MOTOR CONTROL CENTRES) :

- Supply frequency converters (inverters) tailor made for HVAC application with two built in PID controllers, built in HVAC application macros and real-time clock and calendar to control speed of standard AC squirrel cage motors.
- Inverter type - digital Pulse Width Modulation PWM.
- Location - Motor Control Centre (MCC).
- Control range - 0.5 to 120 Hz power factor - 0.97 lagging or better.
- Starting current - not to exceed 1 x FLC.
- Provide integrated, lockable incoming mains isolation switch.

- Characteristics
  - Ensure acceleration and deceleration ramps are independently adjustable
  - Allow connection to a turning motor without braking to a standstill
  - Allow connection to a reverse windmilling fan without causing tripping and return fan to correct speed. Ensure VSD's require no additional means for starting. Supply VSD's that do not require electrical matching to motor. Ensure VSD's are capable of running motors in parallel
  - EMC characteristics to BS EN IEC 61800-3, Category C2
- Standards
  - Comply with relevant parts of BS EN 60204 for safety of electrical equipment
  - Comply with relevant parts of BS EN IEC 61800 and BS EN 61800
  - Comply with relevant parts of BS EN 60068 for environmental testing
- Harmonics
  - Comply with BS EN 61000-3-12
  - Incorporate facilities into the drive to minimise harmonics generated at partial loads to ENA Engineering recommendation G5/4-1 limits
- Mains interruption
  - Ensure VSD does not cause tripping through a mains interruption of 200 msec.
- Protection
  - Ensure VSD incorporates the following protection to cause electronic shut down without operating circuit protective devices
  - Motor phase to phase fault; motor phase to earth fault; overvoltage; undervoltage; VSD overheat; motor overheat; loss of control signal; loss of auxiliary control voltage; current limit
- VSD controls - local/remote facility to be provided where appropriate for operational and maintenance use.
- Display
  - Make provision for inverter to display externally, external and internal faults following a failure.
  - Show 1st, 2nd and 3rd up sequential faults
  - Provide digital readout to show output frequency Hz; reference 1 (hand); reference 2 (auto); motor current (% or Amps); fault memory
  - Provide volt free remote signalling contacts to indicate common fault; running/stopped conditions; healthy/tripped conditions
  - Ensure parameters can be set and fault memory interrogated with door closed, and without additional instrumentation
- Mounting
  - Flange mount vertically within the MCC in accordance with the manufacturer's recommendations.
- Cooling
  - Ensure the free space around the drive is in accordance with the manufacturer's recommendations for ventilation and maintenance
  - When installing a VSD in a cabinet to ensure air cannot be recirculated such that the cooling air does not exceed the unit ambient maximum operating temperature
- Provide isolation during repair and maintenance work in accordance with BS EN 62626-1

2200 AUTOMATIC CHANGEOVER FOR RUN/STANDBY DUTY - SINGLE POWER SUPPLY:

- Fit a control switch to starter enclosure arranged to select either motor for "run" or "standby" duty. Indicate selection of respective motor by illumination of indicator lights on starter enclosure.
- Provide facilities for connection of remote indicator lights to indicate selection/operation of system and for connection of a system malfunction audible alarm where indicated.
- Arrange for selected "run" duty motor to operate in response to system controls, and in event of operation of duty motor starter overcurrent trip, for automatic changeover to "standby" motor.
- Control power supply to starter by an air break isolating switch interlocked with starter enclosure access door.

2210 AUTOMATIC CHANGEOVER FOR RUN/STANDBY DUTY - DUAL POWER SUPPLY:

- Fit a control switch to starter enclosure arranged to select either motor for "run" or "standby" duty.
- Indicate selection of respective motor and availability of the two power supplies by illumination of indicator lights on starter enclosure.

- Provide facilities for connection of remote indicator lights to indicate selection/operation of system and for connection of a system malfunction audible alarm where indicated.
- Arrange for selected "run" duty motor to operate in response to system controls, and on loss of power supply to "run" duty motor or operation of motor starter overcurrent trip, for automatic changeover to "standby" motor.
- Control the two power supplies by a single air break multiple isolating switch interlocked with starter enclosure access door.

2220 CONTROL CIRCUIT POWER SUPPLIES / TRANSFORMERS:
- Provide control circuit transformers to supply power at voltages to suit control components.
- Standard
  - Use transformers in accordance with BS EN 61558-1 and BS EN 61558-2-2 and provide an external label of approved type and size.
- Protection - primary and secondary fuses.

2230A SWITCHING AND INDICATION:
- Provide switches, indicating lamps, instruments and controls of uniform appearance and physically protected.
- Switches and indicators
  - Fit on panel or access doors Stop/Start/Reset push buttons; Auto/Off/Manual control selector switch; run and trip indicator lights.

2240 AUDIBLE ALARMS:
- Ensure that operation of any starter trip lamp, safety circuit lamp or alarm lamp operates a common audible alarm with mute and test facilities and terminals for remote alarm signal.
- When an alarm condition has had the audible alarm muted, ensure that terminals for a remote "alarm accepted" light are energised. The audible alarm circuit and terminals for remote alarm signal must still be capable of indicating another fault occurring even though original fault has not been cleared. The test facilities are to test momentarily both the audible alarm and all alarm indicator lamps, whilst the push button is depressed.
- Use alarms that interface with a sensor or controller to sense set-point and measured value. Provide adjustable upper and lower limits on face of unit. Provide unit with indicating lamps to show which limit has been exceeded. Provide each unit with connections for remote alarm.

2250A PROGRAMMABLE LOGIC CONTROLLERS:
- Provide programmable logic controllers in accordance with the manufacturer's recommendations and the specified control requirements.
- Standard - BS EN 61131.
  - Provide fuse and isolator for the Programmable Logic Controller. Install PLC with control components.
  - Programming language standard - BS EN 61131-3

2260A STARTER AND CONTROL PANEL INTERNAL WIRING:
- Standard
  - BS 6231 for polyvinyl chloride (PVC) tri-rated switchgear cable
  - BS EN 50525-3-41 for Low Smoke Zero Halogen (LSZH) cable
- Wiring coding, selection, installation and termination to BS EN 60445, BS EN 61439-series, BS EN 60204-1 and BS 7671, as relevant.
- Control wiring
  - Segregate control and auxiliary contact wiring from power circuits. Contain control wiring in slotted plastic trunking.
  - Provide electrical separation for voltages of different bands in accordance with BS 7671, BS EN 60204-1 and BS EN 61439-series as relevant.
- Power wiring
  - Take account of thermal effects of grouping when routing power wiring.

- All wires
  - Identify each end of each wire with a unique wire number according to the control panel drawings and cable schedule.
  - Terminate wiring intended for screw terminals with ferrules to facilitate fault-finding and maintenance replacement.

2270A COMPONENT MOUNTING:
- Mount all components of the switchgear and controlgear in accordance with the manufacturer's instructions.
- Mount control components on top hat rails dimensional type TH 35-7,5 to BS EN 60715. Steel rails to be manufactured and finished in accordance with Appendix A to BS EN 60715

2280A CONTROL SYSTEM FUNCTION CHARTS:
- Prepare function charts for the control system in accordance with BS EN 60848. Obtain approval of function chart before design of system hardware or writing control software.
  - Function chart format - Combined function chart/circuit diagram.

3000 WORKMANSHIP

3010 INSTALLATION:
- Install control panels, Motor Control Centre (MCC)s, contactors and starters in accordance with BS EN 60947 and manufacturer's recommendations.

BS APPENDIX

BS 88-3:2010
Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household or similar applications). Examples of standardized systems of fuses A to F.

BS 88-4:1988
Cartridge fuses for voltages up to and including 1000 V a.c. and 1500 V d.c. Part 4 Specification of supplementary requirements for fuse-links for the protection of semiconductor devices

BS 4800:2011
Schedule of paint colours for building purposes

BS 5424-2:1987
Low-voltage controlgear. Part 2 Specification for semiconductor contactors (solid state contactors)

BS 6231:2006
Electric cables. Single core PVC insulated flexible cables of rated voltage 600/1000V for switchgear and controlgear wiring.

BS 6701:2016+A1:2017
Telecommunications equipment and telecommunications cabling. Specification for installation, operation and maintenance

BS 7671:2018
Requirements for electrical installations. IET Wiring Regulations

BS EN 842:1996+A1:2008
Safety of machinery. Visual danger signals. General requirements, design and testing

BS EN 14908-1:2014
Open Data Communication in Building Automation, Controls and Building Management. Control Network Protocol. Part 1 Protocol Stack

BS EN 14908-2:2014
Open Data Communication in Building Automation, Controls and Building Management. Control Network Protocol. Twisted Pair Communication

BS EN 14908-3:2014
Open Data Communication in Building Automation, Controls and Building Management. Control Network Protocol. Part 3 Power Line Channel Specification

BS EN 14908-4:2014
Open Data Communication in Building Automation, Controls and Building Management. Control Network Protocol. IP Communication

BS EN 50173-1:2018
Information technology. Generic cabling systems. Part 1 General requirements

BS EN 50173-2:2018
nformation technology. Generic cabling systems. Part 2: Office spaces

BS EN 50173-3:2018
nformation technology. Generic cabling systems. Part 3: Industrial spaces

BS EN 50173-4:2018
nformation technology. Generic cabling systems. Part 4 Homes

BS EN 50173-5:2018
nformation technology. Generic cabling systems. Part 5 Data centre spaces

BS EN 50173-6:2018
Information technology. Generic cabling systems. Distributed building services

BS EN 50174-1:2018
Information technology. Cabling installation. Installation specification and quality assurance

BS EN 50174-2:2018
Information technology. Cabling installation. Installation planning and practices inside buildings

BS EN 50174-3:2013+A1:2017
Information technology. Cabling installation. Part 3 Installation planning and practices outside buildings

BS EN 50491-11:2015
General requirements for Home and Building Electronic Systems (HBES) and Building Automation and Control Systems (BACS). Smart Metering. Application Specifications. Simple External Consumer Display

BS EN 50525-3-41:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables with special fire performance. Single core non-sheathed cables with halogen-free crosslinked insulation, and low emission of smoke

BS EN 60038:2011
CENELEC standard voltages

BS EN 60068-1:2014
Environmental testing. General and guidance

BS EN 60068-2-1:2007
Environmental testing. Tests. Test A. Cold

BS EN 60068-2-2:2007
Environmental testing. Tests. Test B. Dry heat

BS EN 60068-2-5:2011
Environmental testing. Tests. Test Sa. Simulated solar radiation at ground level and guidance for solar radiation testing

BS EN 60068-2-6:2008
Environmental testing. Tests. Test Fc. Vibration (sinusoidal)

BS EN 60068-2-7:1993
Environmental testing. Test methods. Test Ga and guidance. Acceleration, steady state

BS EN 60068-2-10:2005
Environmental testing. Tests. Test J and guidance: Mould growth

BS EN 60068-2-11:1999
Environmental testing. Test methods. Tests. Test KA. Salt mist

BS EN 60068-2-13:1999
Environmental testing. Test methods. Tests. Test M. Low air pressure

BS EN 60068-2-14:2009
Environmental testing. Tests. Test N. Change of temperature

BS EN 60068-2-17:1995
Environmental testing. Test methods. Test Q. Sealing

BS EN 60068-2-18:2017

Environmental testing. Tests. Tests R and guidance: Water

BS EN 60068-2-20:2008
Environmental testing. Tests. Test T. Test methods for solderability and resistance to soldering heat of devices with leads

BS EN 60068-2-21:2006
Environmental testing. Tests. Test U: Robustness of terminations and integral mounting devices

BS EN 60068-2-27:2009
Environmental testing. Tests. Test Ea and guidance. Shock

BS EN 60068-2-30:2005
Environmental testing. Tests. Test Db and guidance: Damp heat, cyclic (12 h + 12 h cycle)

BS EN 60068-2-31:2008
Environmental testing. Tests. Test Ec. Rough handling shocks, primarily for equipment-type specimens

BS EN 60068-2-38:2009
Environmental testing. Tests. Test Z/AD. Composite temperature/humidity cyclic test

BS EN 60068-2-39:2016
Environmental testing. Tests. Tests and guidance. Combined temperature or temperature and humidity with low air pressure tests

BS EN 60068-2-40:2000
Environmental testing. Test methods. Test Z/AM. Combined cold/low air pressure tests

BS EN 60068-2-41:2000
Environmental testing. Test methods. Tests. Test Z/BM: Combined dry heat/low air pressure tests

BS EN 60068-2-42:2003
Environmental testing. Test methods. Test Kc. Sulphur dioxide test for contacts and connections

BS EN 60068-2-43:2003
Environmental testing. Test methods. Test Kd. Hydrogen sulphide test for contacts and connections

BS EN 60068-2-45:1993
Environmental testing. Test methods. Environmental testing. Tests. Test XA and guidance. Immersion in cleaning solvents

BS EN 60068-2-47:2005
Environmental testing. Tests. Mounting of specimens for vibration, impact and similar dynamic tests

BS EN 60068-2-48:2000
Environmental testing. Test methods. Guidance on the application of the tests of IEC 60068 to simulate the effects of storage

BS EN 60068-2-52:1996
Environmental testing. Test methods. Tests. Test Kb. Salt mist cyclic (sodium chloride solution)

BS EN 60068-2-53:2010
Environmental testing. Tests and guidance. Combined climatic (temperature/humidity) and dynamic (vibration/shock) tests

BS EN 60068-2-55:2013
Environmental testing. Tests. Test Ee and guidance. Loose cargo testing including bounce

BS EN 60068-2-57:2013
Environmental testing. Tests. Test Ff: Vibration. Time-history and sine-beat method

BS EN 60068-2-58:2015
Environmental testing. Tests. Test Td. Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)

BS EN 60068-2-60:2015
Environmental testing. Tests. Test Ke: Flowing mixed gas corrosion test

BS EN 60068-2-61:1994
Environmental testing. Test methods. Test Z/ABDM. Climatic sequence

BS EN 60068-2-64:2008
Environmental testing. Tests. Test Fh. Vibration, broadband random and guidance

BS EN 60068-2-65:2013
Environmental testing. Tests. Test Fg: Vibration. Acoustically induced method

BS EN 60068-2-66:1995
Environmental testing. Test methods. Test Cx. Damp heat, steady state (unsaturated pressurized vapour)

BS EN 60068-2-67:1996
Environmental testing. Test methods. Test Cy. Damp heat, steady state, accelerated test primarily intended for components

BS EN 60068-2-68:1996
Environmental testing. Test methods. Test L. Dust and sand

BS EN 60068-2-69:2017
Environmental testing. Tests. Test Te/Tc. Solderability testing of electronic components and printed boards by the wetting balance (force measurement) method

BS EN 60068-2-70:1996
Environmental testing. Test methods. Test Xb. Abrasion of markings and letterings caused by rubbing of

fingers and hands

BS EN 60068-2-74:2000
Environmental testing. Test methods. Test Xc: Fluid contamination

BS EN 60068-2-75:2014
Environmental testing. Tests. Test Eh: Hammer tests

BS EN 60068-2-77:1999
Environmental testing. Test methods. Body strength and impact shock

BS EN 60068-2-78:2013
Environmental testing. Tests. Test Cab: Damp heat, steady state

BS EN 60068-2-80:2005
Environmental testing. Tests. Test Fi: Vibration. Mixed mode

BS EN 60068-2-81:2003
Environmental testing. Test methods. Test Ei. Shock. Shock response spectrum synthesis

BS EN 60068-2-82:2007
Environmental testing. Tests. Test Tx. Whisker test methods for electronic and electric components

BS EN 60068-2-83:2011
Environmental testing . Tests. Test Tf: Solderability testing of electronic components for surface mounting devices (SMD) by the wetting balance method using solder paste

BS EN 60068-3-1:2011
Environmental testing. Supporting documentation and guidance. Cold and dry heat tests

BS EN 60068-3-2:1999
Environmental testing. Guidance. Combined temperature/low air pressure tests. Combined temperature/low air pressure tests

BS EN 60068-3-3:1993
Environmental testing. Guidance. Environmental testing. Miscellaneous. Guide to seismic test methods for equipment

BS EN 60068-3-4:2002
Environmental testing. Supporting documentation and guidance. Damp heat tests

BS EN 60068-3-5:2002
Environmental testing. Guidance. Confirmation of the performance of temperature chambers

BS EN 60068-3-6:2002
Environmental testing. Guidance. Confirmation of the performance of temperature/humidity chambers

BS EN 60068-3-7:2002
Environmental testing. Guidance. Measurements in temperature chambers for tests A and B (with load)

BS EN 60068-3-8:2003
Environmental testing. Supporting documentation and guidance. Selecting amongst vibration tests

BS EN 60068-3-11:2007
Environmental testing. Supporting documentation and guidance. Calculation of uncertainty of conditions in climatic test chambers

BS EN 60068-3-13:2016
Environmental testing. Supporting documentation and guidance on Test T. Soldering

BS EN 60068-5-2:2000
Environmental testing. Guide to drafting of test methods. Terms and definitions

BS EN 60073:2002
Basic and safety principles for man-machine interface, marking and identification. Coding principles for indicators and actuators

BS EN 60127-2:2014
Miniature fuses. Part 2 Cartridge fuse-links

BS EN 60127-6:2014
Miniature fuses. Part 6 Fuse-holders for miniature fuse-links

BS EN 60204-1:2018
Safety of machinery. Electrical equipment of machines. Part 1 General requirements

BS EN 60204-11:2000
Safety of machinery. Electrical equipment of machines. Requirements for HV equipment for voltages above 1000 V a.c. or 1500 V d.c. and not exceeding 36 kV

BS EN 60204-31:2013
Safety of machinery. Electrical equipment of machines. Particular safety and EMC requirements for sewing machines, units and systems

BS EN 60204-32:2008
Safety of machinery. Electrical equipment of machines. Requirements for hoisting machines

BS EN 60204-33:2011
Safety of machinery. Electrical equipment of machines. Requirements for semiconductor fabrication equipment

BS EN 60269-1:2007+A2:2014
Low-voltage fuses. Part 1 General requirements

BS EN 60269-4:2009+A2:2016
Low-voltage fuses. Part 4 Supplementary requirements for fuse-links for the protection of semiconductor devices

BS EN 60269-6:2011
Low-voltage fuses. Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems

BS EN 60445:2017
Basic and safety principles for man-machine interface, marking and identification. Identification of equipment terminals, conductor terminations and conductors

BS EN 60529:1992+A2:2013
Degrees of protection provided by enclosures (IP code)

BS EN 60715:2017
Dimensions of low-voltage switchgear and controlgear. Standardized mounting on rails for mechanical support of switchgear, controlgear and accessories.

BS EN 60848:2013
GRAFCET specification language for sequential function charts

BS EN 60947-1:2007+A2:2014
Low-voltage switchgear and controlgear. Part 1 General rules

BS EN 60947-2:2017
Low-voltage switchgear and controlgear. Part 2 Circuit-breakers

BS EN 60947-3:2009+A2:2015
Low-voltage switchgear and controlgear. Part 3 Switches, disconnectors, switch-disconnectors and fuse-combination units

BS EN 60947-3:2009+A2:2015
Low-voltage switchgear and controlgear. Part 3 Switches, disconnectors, switch-disconnectors and fuse-combination units

BS EN 60947-4-1:2010+A1:2012
Low-voltage switchgear and controlgear. Part 4-1 Contactors and motor-starters. Electromechanical contactors and motor-starters

BS EN 60947-4-1:2010+A1:2012
Low-voltage switchgear and controlgear. Part 4-1 Contactors and motor-starters. Electromechanical contactors and motor-starters

BS EN 60947-4-2:2012
Low-voltage switchgear and controlgear. Part 4-2 Contactors and motor-starters. A.C. semiconductor motor controllers and starters

BS EN 60947-4-2:2012
Low-voltage switchgear and controlgear. Part 4-2 Contactors and motor-starters. A.C. semiconductor motor controllers and starters

BS EN 60947-4-3:2014
Low-voltage switchgear and controlgear. Contactors and motor-starters. AC semiconductor controllers and contactors for non-motor loads

BS EN 60947-4-3:2014
Low-voltage switchgear and controlgear. Contactors and motor-starters. AC semiconductor controllers and contactors for non-motor loads

BS EN 60947-5-1:2017
Specification for low-voltage switchgear and controlgear. Part 5-1 Control/circuit devices and switching elements. Electromechanical control circuit devices

BS EN 60947-5-1:2017
Specification for low-voltage switchgear and controlgear. Part 5-1 Control/circuit devices and switching elements. Electromechanical control circuit devices

BS EN 60947-5-2:2007+A1:2012
Low-voltage switchgear and controlgear. Control circuit devices and switching elements. Proximity switches

BS EN 60947-5-3:2013
Low-voltage switchgear and controlgear. Control circuit devices and switching elements. Requirements for proximity devices with defined behaviour under fault conditions (PDDB)

BS EN 60947-5-4:2003
Specification for low-voltage switchgear and controlgear. Part 5-4 Control circuit devices and switching elements. Method of assessing the performance of low-energy contacts. Special tests

BS EN 60947-5-5:1998+A2:2017
Low-voltage switchgear and controlgear. Part 5-5: Control circuit devices and switching elements - Electrical emergency stop device with mechanical latching function

BS EN 60947-5-6:2001
Specification for low-voltage switchgear and controlgear. Control circuit devices and switching elements. DC interface for proximity sensors and switching amplifiers (NAMUR). DC interface for proximity sensors and switching amplifiers (NAMUR)

BS EN 60947-5-7:2003
Specification for low-voltage switchgear and controlgear. Control circuit devices and switching elements. Requirements for proximity devices with analogue output

BS EN 60947-5-8:2006
Low-voltage switchgear and controlgear. Control circuit devices and switching elements. Three-position enabling switches

BS EN 60947-5-9:2007
Low-voltage switchgear and controlgear. Control circuit devices and switching elements. Flow rate switches

BS EN 60947-6-1:2005+A1:2014
Low-voltage switchgear and controlgear. Multiple function equipment. Transfer switching equipment

BS EN 60947-6-2:2003
Specification for low-voltage switchgear and controlgear. Part 6-2 Multiple function equipment. Control and protective switching devices (or equipment) (CPS)

BS EN 60947-7-1:2009
Low-voltage switchgear and controlgear. Ancillary equipment. Terminal blocks for copper conductors

BS EN 60947-7-2:2009
Low-voltage switchgear and controlgear. Ancillary equipment. Protective conductor terminal blocks for copper conductors

BS EN 60947-7-3:2009
Low-voltage switchgear and controlgear. Ancillary equipment. Safety requirements for fuse terminal blocks

BS EN 60947-7-4:2013
Low-voltage switchgear and controlgear. Ancillary equipment. PCB terminal blocks for copper conductors

BS EN 60947-8:2003+A2:2012
Specification for low-voltage switchgear and controlgear. Part 8 Control units for built-in thermal protection (PTC) for rotating electrical machines

BS EN 61000-3-12:2011
Electromagnetic compatibility (EMC). Limits. Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and ≤ 75 A per phase

BS EN 61095:2009
Electromechanical contactors for household and similar purposes

BS EN 61131-1:2003
Programmable controllers. Part 1 General information

BS EN 61131-2:2007
Programmable controllers. Part 2 Equipment requirements and tests

BS EN 61131-3:2013
Programmable controllers. Part 3 Programming languages

BS EN 61131-5:2001
Programmable controllers. Part 5 Communications

BS EN 61131-6:2012
Programmable controllers. Functional safety

BS EN 61131-7:2001
Programmable controllers. Part 7 Fuzzy control programming

BS EN 61131-9:2013
Programmable controllers. Single-drop digital communication interface for small sensors and actuators (SDCI)

BS EN 61158-1:2014
Industrial communication networks. Fieldbus specifications. Overview and guidance for the IEC 61158 and IEC 61784 series

BS EN 61158-2:2014
Industrial communication networks. Fieldbus specifications. Physical layer specification and service definition

BS EN 61158-3-1:2014
Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type 1 elements

BS EN 61158-3-2:2014
Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type 2 elements

BS EN 61158-3-3:2014
Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type 3 elements

BS EN 61158-3-4:2014
Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type 4 elements

BS EN 61158-3-7:2008
Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type 7 elements

BS EN 61158-3-8:2008
Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type 8 elements

BS EN 61158-3-11:2008
Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type 11 elements

BS EN 61158-3-12:2014

Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type 12 elements

BS EN 61158-3-13:2014
Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type 13 elements

BS EN 61158-3-14:2014
Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type 14 elements

BS EN 61158-3-16:2008
Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type 16 elements

BS EN 61158-3-17:2008
Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type 17 elements

BS EN 61158-3-18:2008
Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type 18 elements

BS EN 61158-3-19:2014
Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type 19 elements

BS EN 61158-3-20:2014
Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type 20 elements

BS EN 61158-3-21:2012
Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type 21 elements

BS EN 61158-3-22:2014
Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type 22 elements

BS EN 61158-3-24:2014
Industrial communication networks. Fieldbus specifications. Data-link layer service definition. Type-24 elements

BS EN 61158-4-1:2014
Industrial communication networks. Fieldbus specifications. Data-link layer protocol specification. Type 1 elements

BS EN 61158-5-2:2014
Industrial communication networks. Fieldbus specifications. Application layer service definition. Type 2

elements

BS EN 61158-5-3:2014
Industrial communication networks. Fieldbus specifications. Application layer service definition. Type 3 elements

BS EN 61158-5-4:2014
Industrial communication networks. Fieldbus specifications. Application layer service definition. Type 4 elements

BS EN 61158-5-5:2014
Industrial communication networks. Fieldbus specifications. Application layer service definition. Type 5 elements

BS EN 61158-5-7:2008
Industrial communication networks. Part 5-7 Fieldbus specifications. Application layer service definition. Type 7 elements

BS EN 61158-5-8:2008
Industrial communication networks. Part 5-8 Fieldbus specifications. Application layer service definition. Type 8 elements

BS EN 61158-5-9:2014
Industrial communication networks. Fieldbus specifications. Application layer service definition. Type 9 elements

BS EN 61158-6-2:2014
Industrial communication networks. Fieldbus specifications. Application layer protocol specification. Type 2 elements

BS EN 61158-6-3:2014
Industrial communication networks. Fieldbus specifications. Application layer protocol specification. Type 3 elements

BS EN 61158-6-4:2014
Industrial communication networks. Fieldbus specifications. Application layer protocol specification. Type 4 elements

BS EN 61158-6-5:2014
Industrial communication networks. Fieldbus specifications. Application layer protocol specification. Type 5 elements

BS EN 61158-6-7:2008
Industrial communication networks. Part 6-7 Fieldbus specifications. Application layer protocol specification. Type 7 elements

BS EN 61158-6-8:2008
Industrial communication networks. Part 6-8 Fieldbus specifications. Application layer protocol specification. Type 8 elements

BS EN 61158-6-9:2014
Industrial communication networks. Fieldbus specifications. Application layer protocol specification. Type 9 elements

BS EN 61158-6-10:2014
Industrial communication networks. Fieldbus specifications. Application layer protocol specification. Type 10 elements

BS EN 61158-6-11:2008
Industrial communication networks. Part 6-11 Fieldbus specifications. Application layer protocol specification. Type 11 elements

BS EN 61158-6-12:2014
Industrial communication networks. Fieldbus specifications. Application layer protocol specification. Type 12 elements

BS EN 61158-6-13:2014
Industrial communication networks. Fieldbus specifications. Application layer protocol specification. Type 13 elements

BS EN 61158-6-14:2014
Industrial communication networks. Fieldbus specifications. Application layer protocol specification. Type 14 elements

BS EN 61158-6-15:2012
Industrial communication networks. Fieldbus specifications. Application layer protocol specification. Type 15 elements

BS EN 61158-6-17:2008
Industrial communication networks. Part 6-17 Fieldbus specifications. Application layer protocol specification. Type 17 elements

BS EN 61158-6-18:2012
Industrial communication networks. Fieldbus specifications. Application layer protocol specification. Type 18 elements

BS EN 61158-6-19:2019
Industrial communication networks. Fieldbus specifications. Application layer protocol specification. Type 19 elements

BS EN 61439-1:2011
Low-voltage switchgear and controlgear assemblies. Part 1 General rules

BS EN 61439-1:2011
Low-voltage switchgear and controlgear assemblies. Part 1 General rules

BS EN 61439-2:2011

Low-voltage switchgear and controlgear assemblies. Power switchgear and controlgear assemblies

BS EN 61439-2:2011
Low-voltage switchgear and controlgear assemblies. Power switchgear and controlgear assemblies

BS EN 61439-3:2012
Low-voltage switchgear and controlgear assemblies. Distribution boards intended to be operated by ordinary persons (DBO)

BS EN 61439-4:2013
Low-voltage switchgear and controlgear assemblies. Particular requirements for assemblies for construction sites (ACS)

BS EN 61439-5:2015
Low-voltage switchgear and controlgear assemblies. Assemblies for power distribution in public networks

BS EN 61439-6:2012
Low-voltage switchgear and controlgear assemblies. Busbar trunking systems (busways)

BS EN 61558-1:2005+A1:2009
Safety of power transformers, power supplies, reactors and similar products. Part 1 General requirements and tests

BS EN 61558-2-2:2007
Safety of power transformers, power supplies, reactors and similar products. Part 2-2 Particular requirements and tests for control transformers and power supplies incorporating control transformers

BS EN 61800-1:1998
Adjustable speed electrical power drive systems. Part 1 Rating specifications for low voltage adjustable speed d.c. power drive systems

BS EN 61800-2:2015
Adjustable speed electrical power drive systems. General requirements. Rating specifications for low voltage adjustable speed a.c. power drive systems

BS EN 61800-4:2003
Adjustable speed electrical power drive systems. Part 4 General requirements. Rating specifications for a.c. power drive systems above 1 000 V a.c. and not exceeding 35 kV

BS EN 61800-5-1:2007+A1:2017
Adjustable speed electrical power drive systems. Part 5-1 Safety requirements - Electrical, thermal and energy

BS EN 61800-5-2:2017
Adjustable speed electrical power drive systems. Safety requirements. Functional

BS EN 61800-7-1:2016
Adjustable speed electrical power drive systems. Generic interface and use of profiles for power drive

systems. Interface definition

BS EN 61800-7-201:2016
Adjustable speed electrical power drive systems. Generic interface and use of profiles for power drive systems. Profile type 1 specification

BS EN 61800-7-202:2016
Adjustable speed electrical power drive systems. Generic interface and use of profiles for power drive systems. Profile type 2 specification

BS EN 61800-7-203:2016
Adjustable speed electrical power drive systems. Generic interface and use of profiles for power drive systems. Profile type 3 specification

BS EN 61800-7-204:2016
Adjustable speed electrical power drive systems. Generic interface and use of profiles for power drive Systems. Profile type 4 specification

BS EN 61800-7-301:2016
Adjustable speed electrical power drive systems. Generic interface and use of profiles for power drive systems. Mapping of profile type 1 to network technologies

BS EN 61800-7-302:2016
Adjustable speed electrical power drive systems. Generic interface and use of profiles for power drive systems. Mapping of profile type 2 to network technologies

BS EN 61800-7-303:2016
Adjustable speed electrical power drive systems. Generic interface and use of profiles for power drive systems. Mapping of profile type 3 to network technologies

BS EN 61800-7-304:2016
Adjustable speed electrical power drive systems. Generic interface and use of profiles for power drive systems. Mapping of profile type 4 to network technologies

BS EN 61800-9-1:2017
Adjustable speed electrical power drive systems. Ecodesign for power drive systems, motors starters, power electronics and their driven applications. General requirements for setting energy efficiency standards for power driven equipment using extended product approach (EPA) and semi analytic model (SAM)

BS EN 61800-9-2:2017
Adjustable speed electrical power drive systems. Ecodesign for power drive systems, motor starters, power electronics and their driven applications. Energy efficiency indicators for power drive systems and motor starters

BS EN 61810-1:2015
Electromechanical elementary relays. General and safety requirements

BS EN 61810-2-1:2017

Electromechanical elementary relays. Reliability. Procedure for the verification of B10 values

BS EN 61810-2:2017
Electromechanical elementary relays. Reliability

BS EN 61810-3:2015
Electromechanical elementary relays. Relays with forcibly guided (mechanically linked) contacts

BS EN 61810-7:2006
Electromechanical elementary relays. Test and measurement procedures

BS EN 61812-1:2011
Time relays for industrial and residential use. Part 1 Requirements and tests

BS EN 61968-9:2014
Application integration at electric utilities. System interfaces for distribution management. Interfaces for meter reading and control

BS EN 62056-1-0:2015
Electricity metering data exchange. The DLMS/COSEM suite. Smart metering standardization framework

BS EN 62056-3-1:2014
Electricity metering data exchange. The DLMS/COSEM suite. Use of local area networks on twisted pair with carrier signalling

BS EN 62056-4-7:2016
Electricity metering data exchange. The DLMS/COSEM suite. DLMS/COSEM transport layer for IP networks

BS EN 62056-5-3:2017
Electricity metering data exchange. The DLMS/COSEM suite. DLMS/COSEM application layer

BS EN 62056-6-1:2017
Electricity metering data exchange. The DLMS/COSEM suite. Object Identification System (OBIS)

BS EN 62056-7-3:2017
Electricity metering data exchange. The DLMS/COSEM suite. Wired and wireless M-Bus communication profiles for local and neighbourhood networks

BS EN 62056-7-5:2016
Electricity metering data exchange. The DLMS/COSEM suite. Local data transmission profiles for Local Networks (LN)

BS EN 62056-7-6:2013
Electricity metering data exchange. The DLMS/COSEM suite. The 3-layer, connection-oriented HDLC based communication profile

BS EN 62056-8-3:2013
Electricity metering data exchange. The DLMS/COSEM suite. Communication profile for PLC S-FSK neighbourhood networks

BS EN 62056-8-5:2017
Electricity metering data exchange. The DLMS/COSEM suite. Narrow-band OFDM G3-PLC communication profile for neighbourhood networks

BS EN 62056-8-6:2017
Electricity metering data exchange. The DLMS/COSEM suite. High speed PLC ISO/IEC 12139-1 profile for neighbourhood networks

BS EN 62056-9-7:2013
Electricity metering data exchange. The DLMS/COSEM suite. Communication profile for TCP-UDP/IP networks

BS EN 62056-21:2002
Electricity metering. Data exchange for meter reading, tariff and load control. Direct local data exchange

BS EN 62056-42:2002, IEC 62056-42:2002
Electricity metering. Data exchange for meter reading, tariff and load control. Physical layer services and procedures for connection-oriented asynchronous data exchange

BS EN 62056-46:2002
Electricity metering. Data exchange for meter reading, tariff and load control. Data link layer using HDLC protocol

BS EN 62056-53:2007
Electricity metering. Data exchange for meter reading, tariff and load control. COSEM application layer

BS EN 62208:2011
Empty enclosures for low-voltage switchgear and controlgear assemblies. General requirements

BS EN 62262:2002
Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)

BS EN 62626-1:2014
Low-voltage switchgear and controlgear enclosed equipment. Enclosed switch-disconnectors outside the scope of IEC 60947-3 to provide isolation during repair and maintenance work

BS EN 62769-1:2015
Field device integration (FDI). Overview

BS EN 62769-2:2015
Field Device Integration (FDI). FDI Client

BS EN 62769-3:2015

Devices and integration in enterprise systems; Field Device Integration. FDI Server

BS EN 62769-4:2015
Field Device Integration (FDI). FDI Packages

BS EN 62769-5:2015
Field Device Integration (FDI). FDI Information Model

BS EN 62769-6:2015
Field Device Integration (FDI). FDI Technology Mapping

BS EN 62769-7:2015
Field Device Integration (FDI). FDI Communication Devices

BS EN 62769-101-1:2015
Field Device Integration (FDI). Profiles. Foundation Fieldbus H1

BS EN 62769-101-2:2015
Field Device Integration (FDI). Profiles. Foundation Fieldbus HSE

BS EN 62769-103-1:2015
Field Device Integration (FDI). Profiles. PROFIBUS

BS EN 62769-103-4:2015
Field Device Integration (FDI). Profiles. PROFINET

BS EN 62769-109-1:2015
Field Device Integration (FDI). Profiles. HART(r) and WirelessHART(r)

BS EN ISO 16484-5:2017
Building automation and control systems (BACS). Part 5 Data communication protocol

Y73 LUMINAIRES AND LAMPS

1000 GENERAL

- Lamps and related equipment to comply with EU Regulation 2015/1428 with regard to ecodesign requirements.

2000 PRODUCTS/MATERIALS

2005 LAMP EFFICACY:

- For non-domestic buildings, the system is designed to achieve an average initial circuit of at least 60 lumens/watt for fixed lighting equipment within the building.

2010A LUMINAIRES - GENERAL PURPOSE:

- Standards
  - Supply luminaires with photometric data in accordance with BS EN 13032-1.
  - Supply luminaires in accordance with BS EN 60598
  - Supply luminaires with performance in accordance with:
    - BS EN 62722-1 in general.
    - BS EN 62722-2-1 for LED luminaires.
    - BS EN 62922 for organic LED (OLED) panels.
- Classification - To BS EN 60598-1.
- Ensure ground recessed luminaires are selected and installed in accordance with the guidance provided in Table A.1 of BS EN 60598-2-13, with respect to their location and intended application.
- Safety Support for Components
  - Provide secondary support for translucent covers, diffusers and gear trays so they are prevented from falling when their primary fixing is released.
- Photometric performance
  - Ensure luminaires of similar type have same photometric performance as published data within the tolerances defined by BS EN 13032-1.
- Electromagnetic compatibility
  - Ensure luminaires comply with BS EN 61547 for EMC immunity.

2010B LUMINAIRES - GENERAL PURPOSE WITH SAFETY GLASS:

- Standards
  - Supply luminaires with photometric data in accordance with BS EN 13032-1.
  - Supply luminaires in accordance with BS EN 60598
  - Supply luminaires with performance in accordance with:
    - BS EN 62722-1 in general.
    - BS EN 62722-2-1 for LED luminaires.
- Classification - to BS EN 60598-1.
- Safety
  - Fit luminaire with cover glass to protect against ultra-violet emission and risk from explosion of lamps.
- Safety Support for Components
  - Provide secondary support for translucent covers, diffusers and gear trays so they are prevented from falling when their primary fixing is released.
- Photometric performance
  - Ensure luminaires of similar type have same photometric performance as published data within the tolerances defined by BS EN 13032-1.
- Electromagnetic compatibility
  - Ensure luminaires comply with BS EN 61547 for EMC immunity.

2020A EMERGENCY LIGHTING LUMINAIRES:

- Comply with BS EN 60598-2-22.

- Comply with ICEL:1001. Ensure emergency lighting luminaires are marked with ICEL certification label.
- Supply luminaires with performance in accordance with:
  - BS EN 62722-1 in general.
  - BS EN 62722-2-1 for LED luminaires.

2040 HAZARDOUS AREA LUMINAIRES
- Standard - BS EN IEC 60079/BS EN 60079

2050A SIGNS AND HIGH VOLTAGE INSTALLATIONS:
- Comply with BS 559 and BS EN 50107-1.
- Neon transformers
  - Supply transformers for tubular discharge lamps with no-load output voltage exceeding 1000 V in accordance with BS EN 61050.
    - Secondary protection to BS EN 50107-2.

2057 LED LUMINAIRES:
- Standards
  - Supply luminaires with photometric data in accordance with BS EN 13032-1
  - Supply luminaires in accordance with BS EN 60598
  - Supply luminaires with performance in accordance with BS EN 62722-1 and BS EN 62722-2-1
- Classification to BS EN 60598-1
- Safety support for components
  - Provide secondary support for translucent covers, diffusers and gear trays so they are prevented from falling when their primary fixing is released.
- Photometric performance
  - Ensure luminaires of similar type have same photometric performance as published data within the tolerances defined by BS EN 13032-1
- Electromagnetic compatibility
- Ensure luminaires comply with BS EN 61547 for EMC immunity.

2070 LAMPHOLDERS - TUNGSTEN FITTINGS:
- Use following lampholders for tungsten filament lamps unless indicated otherwise.
  - Lamp Lampholder.
  - Up to 150 W bayonet B22d.
  - 200 W Edison screw E27 2A.
  - 300 W Edison screw E40 16A.
- Shade rings
  - Provide a shade carrier ring for separately mounted lampholders for GLS tungsten filament lamps.
- Polarity of Edison Screw Lampholders
  - Ensure phase conductor is connected to centre contact.
  - Temperature rating in excess of the minimum required by the relevant standard

2080A LAMPHOLDERS - MOUNTING:
- Securely mount lampholder in luminaire when it is sole support for lamp.
- Cord grip
  - Provide integral cord grip type when lampholders are suspended by cord.
- Conduit Mounted
  - When mounted directly to conduit system use backplate lampholder for conduit box.

2090A CONTROL GEAR AND COMPONENTS:
- Compatibility

- Ensure control gear and components are suitable for lamp type, wattage and starting characteristics. Obtain from manufacturers written confirmation of compatibility.
- Efficiency tested in accordance with the relevant parts of BS EN IEC 62442 and BS EN 62442
-

2095 CIRCUIT LOSSES:

- Use high frequency ballasts to ensure the installed circuit load does not exceed 3 W/m^2/ 100 lux.
- Efficiency tested in accordance with relevant parts of BS EN IEC 62442 and BS EN 62442.

2100A FLUORESCENT LAMP BALLASTS AND STARTERS:

- Ballasts
  - BS EN 61347-2-8
  - BS EN 60921
  - For d.c. supplied electronic ballasts
    - BS EN 61347-2-3
    - BS EN 61347-2-7
    - BS EN 60929
  - BS EN 60081
  - BS EN 60901
  - Supply thermal protectors for ballasts for tubular fluorescent lamps to BS EN 60730-2-3.
- Starters
  - BS EN 61347-2-1
  - BS EN 60927
- Use low distortion type.

2110A DISCHARGE LAMP BALLASTS AND STARTERS:

- Ballasts
  - BS EN 61347-2-9
  - BS EN 60923.
- Starters
  - BS EN 61347-2-1
  - BS EN 60927

2115 LED MODULE CONTROL GEAR:

- Provide LED module control gear to BS EN 61347-2-13 and BS EN 62384.

2120A CAPACITORS:

- Use capacitors in accordance with BS EN 61048 and BS EN 61049 in tubular fluorescent, high pressure mercury and low pressure sodium vapour discharge lamp circuits.

2130 SUPPLY TERMINALS:

- Use screw terminals for supply cables and circuit protective conductors, sized to terminate up to three 2.5mm^2 conductors. Provide separate terminal blocks for each incoming circuit, with marking to identify each circuit.

2140 FUSE:

- Include a fuse holder and BS 1362 fuse in each incoming circuit phase connection.

2160 REMOTE GEAR:

- Locate control gear in separate lockable cabinet of sheet steel with same degree of protection and finish specified for luminaire. Comply with manufacturer's recommendations for maximum cable length between gear and lamp.

2165 TYPES OF HIGH EFFICIENCY LAMP FOR NON-DAYLIT AREAS:

Light Source	Type
High pressure sodium	All ratings above 70W
Ceramic metal halide	All ratings above 20W
LED	Refer to lm/W efficacy
Metal halide	All ratings above 70W
Tubular fluorescent	16mm (T5) lamps rated above 11W
Compact fluorescent	All ratings above 26W

2170A TUNGSTEN FILAMENT LAMPS:
- Comply with
  - BS EN 60064
  - BS EN 60432-1
  - BS EN 60630.
- Supply electronic step-down converters for filament lamps to
  - BS EN 61047
  - BS EN 61347-2-2.
- Comply with BS EN 61549 for double capped and ELV lamps.

2180A FLUORESCENT LAMPS:
- Standard
  - Internationally specified tubular lamps
    - BS EN 61195 for safety.
    - BS EN 60081 for performance.
  - UK tubular lamps to BS 1853-2.
  - Single capped lamps
    - BS EN 60901 for performance.
    - BS EN 61199 for safety.
  - Double capped lamps
    - BS EN 61195 for safety.
    - BS EN 60081 for performance.
  - Self ballasted lamps
  - BS EN 60968 for safety.
  - BS EN 60969 for performance.

2185A TUNGSTEN HALOGEN LAMPS:
- Comply with
  - BS EN 60432-2
  - BS EN 60357

2190 HIGH PRESSURE MERCURY VAPOUR LAMPS:
- Comply with
  - BS EN 60188
  - BS EN 62035

2215A LED LAMPS:

- Comply with
  - BS EN 50564 for measurement of low power consumption.
  - BS EN 62031 for measurement of low power consumption.
  - BS EN 62612 or self-ballasted LED lamps, for supply voltages > 50 V.
  - BS EN 62838 for LEDsi lamps with supply voltage not exceeding AC 50V or ripple-free DC 120 V.
  - BS EN 62868 and BS EN 62922 for Organic LED (OED) panels.
  - BS EN 62386-207 for digital addressable lighting interface (DALI) control gear.
  - BS EN 61347-2-13 and BS EN 62384 for control gear for LED modules.

2215B LED MODULES:

- Comply with
  - BS EN 61347-2-13 and BS EN 62384 for control gear.
  - BS EN 62386-207 for digital addressable lighting interface (DALI) control gear.
  - BS EN 62868 and BS EN 62922 for Organic LED (OLED) panels.

2220A TRANSFORMERS FOR LV LUMINAIRES:

- Type
  - Electronic.
  - Single luminaire.
- Duty
  - Input voltage 230 volts.
  - Output voltage to suit lamp.
  - Single-phase.
  - Frequency 50 Hz.
  - Rating (kVA) to suit lamp.
- Standards
  - Relevant parts of BS EN 55014.
  - BS EN 61000.
  - BS EN 61047.
  - BS EN 61347-2-2.
  - or BS EN 61558 as appropriate.
- Construction
  - Manufacturer's standard.
- Protection
  - Thermal cut out with automatic reset.
- Location
  - Be accessible.
- Cabling
  - Secondary maximum cable length as manufacturer's recommendations.
  - Separate transformer from secondary low voltage cables (m)
- Connections to luminaires
  - Hard wired
  - Plug and socket

2240A SUPPORT SYSTEM - CONDUIT:

Use not less than 20mm conduit of same type as main conduit system.
Material - steel.

2250A SUPPORT SYSTEM - ROD:

- Use continuously threaded rods with matching washers and nuts.
- Diameter - 6mm.
- Material - Cadmium plated steel.

2260A SUPPORT SYSTEM - CHAIN:
- Use cadmium plated steel chain with load carrying capacity of not less than twice weight of complete luminaire.

2270A SUPPORT SYSTEM - FLEXIBLE CORD:
- Use size and type as indicated.
- Confirm temperature rating is suitable for operating temperature of luminaire or lampholder. Confirm that cord is adequate for mass to be supported.

2280A SUPPORT SYSTEM - WALL BRACKETS:
- Provide wall brackets. Confirm wall brackets are suitable for supporting luminaire.

2290 SUPPORT SYSTEM - BALL AND SOCKET:
- Provide ball and socket as top support, complete with cover fixed to circular conduit box.

2295 SUPPORT SYSTEM - WIRE ROPE:
- Provide wire rope support system. Confirm wire rope is suitable for supporting luminaires.

2300A STEEL COLUMNS AND BOLLARDS:
- Standards
  - BS EN 40-2
  - BS EN 40-5
- Material - Steel.
- Bracket - Match column.
- Earthing
  - Include earthing terminal fixed within service compartment.
- Column base plate - Standard.

2300B COLUMNS AND BOLLARDS:
- Standard - BS EN 40-2.
- Material - Reinforced or prestressed concrete.
- Bracket - Match column.
- Earthing
  - Include earthing terminal fixed within service compartment.
- Column base plate - Standard.

2300C ALUMINIUM COLUMNS AND BOLLARDS:
- Standards
  - BS EN 40-2
  - BS EN 40-6
- Material - Aluminium.
- Bracket - Match column.
- Earthing
  - Include earthing terminal fixed within service compartment.
  - Column base plate - Standard.

2305 LIGHTING COLUMN/BOLLARD SWITCHGEAR:

- Service compartment
  - Standards
    - BS EN 40-2
    - BS 7671
  - Accessible only by use of a key or tool
    - Type to manufacturers standard.
    - IP Rating to BS EN 60529.
    - IP44.
    -
- Switchgear and circuit protection
  - Enclosure
    - Standard BS EN 61439.
    - IP Rating to BS EN 60529
      - Drip-proof to a minimum of IP31.
      -
  - Circuit protective devices/Isolators
    - Standard
      - BS EN 60898.
      - BS EN 61008.
      - BS EN 61009.
      - BS 88 (BS EN 60269).
      - BS EN 60947.
      -
      - Means of isolation
      - Fuse.
      - Double pole mcb with key lockoff cutout facility.
      - Double pole, fuse with key lock off cutout facility.
      - Ensure fuse can be extracted without the use of special tools or protective measures.
      - Key-lockable lock off facility.
      -
    - Overcurrent protective device rating
      - 6 A.
  -

3000 ACCESSORIES

3010A TRACK LIGHTING:
- Where indicated provide track for fixing fittings in accordance with BS EN 60570.

3030A AIR HANDLING LUMINAIRES:
- Provide assembly of luminaire and exhaust air device or luminaire and supply air device to meet design requirements for illumination and air flow. Ensure assembly can be integrated into a false ceiling, flush mounted.
- Diffuser
  - Allow for the path of exhaust air in the diffuser.
  - Exhaust air outlet
  - Provide an outlet for the air via a series of circular openings in top of assembly casing.
- Supply air diffuser
  - Supply the air diffuser as a component of the assembly.
- Fixing
  - Ensure the fixing is capable of carrying the weight of the whole assembly.

4000 WORKMANSHIP

4060 MATERIAL OF SUPPORTING SURFACE:
- Ensure classification of luminaires is appropriate. Do not mount luminaires on readily flammable surfaces.

4080 LUMINAIRES IN AREAS WITH INFRARED CONTROL SYSTEM:
- Install luminaires in areas with infrared control systems or data bearers so as to cause minimum disturbance to the infrared transmission system in accordance with BS 7693.

4100 INSTALLATION OF EXTRA LOW VOLTAGE TUNGSTEN HALOGEN LAMPS:
- Use same wattage lamp on luminaires fed from common transformer. Supply each luminaire on common transformer by separate cable of same cross-sectional area.

4110 SUPPORT:
- Ensure support is adequate for weight of luminaires.
- Number
  - Provide the following minimum number of supports for each luminaire longer than 600mm.

Luminaire width (mm)	Minimum number of supports
Up to and including 300	2
Over 300	4

-

4110A SUPPORT:
- Ensure support is adequate for weight of luminaires.
- Number
  - Provide the following minimum number of supports for each luminaire longer than 600mm.

Luminaire width (mm)	Minimum number of supports
Up to and including 300	2
Over 300	4

-

4120 SUPPORT FROM CONDUIT:
- Where luminaire is supported from conduit, provide a conduit box forming an integral part of conduit system at each point of suspension. Ensure suspensions are vertical.
- Where conduit enters luminaire use back-nuts and washers to secure luminaire body to conduit support. Provide tube with corrosion resistance equal to conduit system.
- Do not support luminaires directly from conduit boxes made from non-metal or heat sensitive materials, where the temperature of the material may exceed 60°C or the mass suspended exceeds 3kg.

4130 SUPPORT FROM TRUNKING:
- Where luminaire is supported from trunking use propriety clamps or brackets appropriate to the luminaire and trunking.
- Do not support luminaires directly from trunking made from non-metal or heat sensitive materials, where the temperature of the material may exceed 60°C or the mass suspended exceeds 3kg.

4140A SUPPORT BY DIRECT FIXING:
- Refer to fixing methods, use luminaire supporting coupler to follow manufacturer's recommendations.

4160 SUSPENSION:
- Suspend luminaires at height indicated. Ensure suspension hang vertically unless otherwise indicated.

4170 SUSPENSION BY ROD:

- Use washers, nut and lock-nut at top and bottom of rod. Paint cut ends with calcium plumbate primer or zinc rich paint.

4180 SUSPENSION BY CHAIN:

- Use hook cover for suspension from circular conduit box. For connection to luminaires use luminaire manufacturer's own chain hook, but if not available use hook with standard screw threaded body to be secured to luminaire body with nuts and washers. Where indicated use captive hooks.

4210A COLUMNS AND BOLLARDS:

- Location - Confirm location before excavation.
- Bases - Install bases in accordance with bollard or column manufacturer's instructions.
- Mounting
  - Mount column or bollard on base as recommended by manufacturer.
  - Ensure columns and bollards are vertical unless otherwise indicated.
- Earthing
  - Install circuit protective conductor to connect luminaire to earthing terminal in service compartment; size circuit protective conductor same as live conductors. Bond accessible metal parts of column or bollard to earthing terminal.

4220 CONNECTIONS TO LUMINAIRES

- Cable Protection
  - Use appropriate size of grommet where cables enter through hole in luminaire body.
- Earthing
  - Ensure that the earthing terminal of Class 1 luminaires is connected to the conduit protective conductor of the supply circuit.
- Loose Wiring
  - Clip or tie back with suitable proprietary devices loose wiring within luminaire, at 300mm intervals.

4230A CONNECTIONS TO LUMINAIRES - DIRECT TO CONDUIT - TERMINAL BOX:

- Terminate circuit wiring in terminal block within supporting conduit box. Use flexible cord from terminal block to luminaire.

4230B CONNECTIONS TO LUMINAIRES - DIRECT TO CONDUIT - AT LUMINAIRE:

- Terminate circuit wiring at supply terminals of luminaire. Take all conductors through same cable entry into luminaire.

4240A CONNECTIONS TO LUMINAIRES - DIRECT TO TRUNKING - TERMINAL BOX:

- Terminate circuit wiring in terminal block in an adaptable box located on side of trunking. Use flexible cord from terminal block to luminaire.

4240B CONNECTIONS TO LUMINAIRES - DIRECT TO TRUNKING - AT LUMINAIRE:

- Terminate circuit wiring at supply terminals of luminaire. Take all conductors through same cable entry into luminaire.

4260A CONNECTIONS TO LUMINAIRES - RECESSED FITTINGS - PLUG AND SOCKET:

- Where luminaires are recessed in a suspended ceiling, terminate circuit wiring at plug and socket to BS 546, located not more than 500mm from the access through the ceiling. Use flexible cord from plug of ceiling rose to supply terminals of luminaire.

4260B CONNECTIONS TO LUMINAIRES - RECESSED FITTINGS - TERMINAL BOX:
- Where luminaires are recessed in a suspended ceiling, terminate circuit wiring in terminal block within conduit box. Install wiring to luminaire as indicated in wiring diagram.

4270 CONNECTIONS TO LUMINAIRES - CONDUIT SUSPENSION:
- Terminate circuit wiring in terminal block within supporting conduit box. Use flexible cable from terminal block to luminaire, installed within tube.

4280 CONNECTIONS TO LUMINAIRES - ROD OR CHAIN SUSPENSION:
- Terminate circuit wiring in terminal block within supporting conduit box. Use flexible cord from terminal block to luminaire and clip cable to one of the rods or chains, do not weave cable through links of the chain.

4290 CONNECTIONS TO LUMINAIRES - MICS CABLE:
- Fix cable gland to luminaire and continue conductors to supply terminals of luminaire.

4300A SEPARATE LIGHTING SWITCHES ON DIFFERENT PHASES:
- Install lighting switches on different phases at least 2m apart.

4300B PHASE BARRIER LIGHTING SWITCHES ON DIFFERENT PHASES:
- When lighting switches on different phases are in a common box, use phase barrier switches in accordance with BS 7671.

BS APPENDIX

BS 88-3:2010
Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household or similar applications). Examples of standardized systems of fuses A to F.

BS 88-4:1988
Cartridge fuses for voltages up to and including 1000 V a.c. and 1500 V d.c. Part 4 Specification of supplementary requirements for fuse-links for the protection of semiconductor devices

BS 546:1950
Specification. Two-pole and earthing-pin plugs, socket-outlets and socket-outlet adaptors.
If required, see also Supplement No 1:1960 Specification for plugs made of resilient material

BS 559:2009
Specification for the design and construction of signs for publicity, decorative and general purposes

BS 1362:1973
Specification for general purpose fuse links for domestic and similar purposes (primarily for use in plugs)

BS 1853-2:1995
Tubular fluorescent lamps for general lighting service. Part 2 Specification for lamps used in the UK not included in BS EN 60081, BS EN 60901, BS EN 61195 and BS EN 61199

BS 4533-102.1:1990, EN 60598-2-1:1989

Luminaires. Particular requirements. Part 102.1 Specification for fixed general purpose luminaires

BS 4533-102.19:1990
Luminaires. Particular requirements. Part 102.19 Specification for air-handling luminaires (safety requirements)

BS 5489-1:2013
Code of practice for the design of road lighting. Part 1 Lighting of roads and public amenity areas

BS 7654:2010
Specification for single-phase street lighting cut-outs for low-voltage public electricity distribution systems. 25 A rating for highway power supplies and street furniture

BS 7671:2018
Requirements for electrical installations. IET Wiring Regulations

BS 7693:1993
Guide to uses of infra-red transmission and the prevention or control of interference between systems

BS 7895:1997
Specification for bayonet lampholders with enhanced safety

BS EN 40-2:2004
Lighting columns. Part 2 General requirements and dimensions

BS EN 40-5:2002
Lighting columns. Part 5 Requirements for steel lighting columns

BS EN 40-6:2002
Lighting columns. Part 6 Requirements for aluminium lighting columns

BS EN 40-7:2002
Lighting columns. Part 7 Requirements for fibre reinforced polymer composite lighting columns

BS EN 12385-1:2002+A1:2008
Steel wire ropes. Safety. Part 1 General requirements

BS EN 12767:2007
Passive safety of support structures for road equipment. Requirements, classification and test methods

BS EN 13032-1:2004+A1:2012
Light and lighting. Measurement and presentation of photometric data of lamps and luminaires. Part 1 Measurement and file format

BS EN 13411-3:2004+A1:2008
Terminations for steel wire ropes. Safety. Part 3 Ferrules and ferrule-securing

BS EN 13411-4:2011
Terminations for steel wire ropes. Safety. Part 4 Metal and resin socketing

BS EN 50107-1:2002
Signs and luminous-discharge-tube installations operating from a no-load rated output voltage exceeding 1 kV but not exceeding 10 kV. Part 1 General requirements

BS EN 50107-2:2005
Signs and luminous-discharge-tube installations operating from a no-load rated output voltage exceeding 1 kV but not exceeding 10 kV. Part 2 Requirements for earth-leakage and open-circuit protective devices

BS EN 50564:2011
Electrical and electronic household and office equipment. Measurement of low power consumption

BS EN 55014-1:2017
Electromagnetic compatibility. Requirements for household appliances, electric tools and similar apparatus. Part 1 Emission

BS EN 55014-2:1997+A2:2008
Electromagnetic compatibility. Requirements for household appliances, electric tools and similar apparatus. Immunity. Part 2 Product family standard

BS EN 55014-2:2015
Electromagnetic compatibility. Requirements for household appliances, electric tools and similar apparatus. Immunity. Product family standard

BS EN 60061-1:1993+A57:2018
Lamp caps and holders together with gauges for the control of interchangeability and safety. Lamp caps

BS EN 60061-2:1993+A54:2018
Lamp caps and holders together with gauges for the control of interchangeability and safety. Part 2 Lampholders

BS EN 60064:1995+A5:2009
Tungsten filament lamps for domestic and similar general lighting purposes. Performance requirements

BS EN 60079-1:2014
Explosive atmospheres. Equipment protection by flameproof enclosures "d"

BS EN 60079-2:2014
Explosive atmosphere. Equipment protection by pressurized enclosure "p"

BS EN 60079-5:2015
Explosive atmospheres. Equipment protection by powder filling "q"

BS EN 60079-6:2015
Explosive atmospheres. Equipment protection by liquid immersion “o”

BS EN 60079-10-1:2015
Explosive atmospheres. Part 10-1 Classification of areas. Explosive gas atmospheres

BS EN 60079-10-2:2015
Explosive atmospheres. Classification of areas. Explosive dust atmospheres

BS EN 60079-11:2012
Explosive atmospheres. Part 11 Equipment protection by intrinsic safety "i"

BS EN 60079-13:2017
Explosive atmospheres. Equipment protection by pressurized room "p"

BS EN 60079-14:2014
Explosive atmospheres. Electrical installations design, selection and erection

BS EN 60079-15:2010
Explosive atmospheres. Part 15 Equipment protection by type of protection "n"

BS EN 60079-17:2014
Explosive atmospheres. Part 17 Electrical installations inspection and maintenance

BS EN 60079-18:2015+A1:2017
Explosive atmospheres. Equipment protection by encapsulation "m"

BS EN 60079-19:2011+A1:2015
Explosive atmospheres. Equipment repair, overhaul and reclamation

BS EN 60079-20-1:2010
Explosive atmospheres. Material characteristics for gas and vapour classification. Test methods and data

BS EN 60079-25:2010
Explosive atmospheres. Part 25 Intrinsically safe electrical systems

BS EN 60079-26:2015
Explosive atmospheres. Equipment with equipment protection level (EPL) Ga

BS EN 60079-27:2008
Explosive atmospheres. Fieldbus intrinsically safe concept (FISCO)

BS EN 60079-28:2015
Explosive atmospheres. Protection of equipment and transmission systems using optical radiation

BS EN 60079-29-1:2016
Explosive atmospheres. Gas detectors. Performance requirements of detectors for flammable gases

BS EN 60079-29-2:2015
Explosive atmospheres. Gas detectors. Selection, installation, use and maintenance of detectors for flammable gases and oxygen

BS EN 60079-29-3:2014
Explosive atmospheres. Gas detectors. Guidance on functional safety of fixed gas detection systems

BS EN 60079-29-4:2010
Explosive atmospheres. Gas detectors. Performance requirements of open path detectors for flammable gases

BS EN 60079-30-1:2017
Explosive atmospheres. Electrical resistance trace heating. General and testing requirements

BS EN 60079-30-2:2017
Explosive atmospheres. Part 30-2 Electric resistance trace heating. Application guide for design, installation and maintenance

BS EN 60079-31:2014
Explosive atmospheres. Equipment dust ignition protection by enclosure "t"

BS EN 60079-32-2:2015
Explosive atmospheres. Electrostatics hazards. Tests

BS EN 60079-35-1:2011
Explosive atmospheres. Caplights for use in mines susceptible to firedamp. General requirements. Construction and testing in relation to the risk of explosion

BS EN 60079-35-2:2012
Explosive atmospheres. Caplights for use in mines susceptible to firedamp. Performance and other safety-related matters

BS EN 60081:1998+A11:2018
Double-capped fluorescent lamps. Performance specifications

BS EN 60155:1995
Glow-starters for fluorescent lamps

BS EN 60188:2001
High-pressure mercury vapour lamps. Performance specifications

BS EN 60269-1:2007+A2:2014
Low-voltage fuses. Part 1 General requirements

BS EN 60269-4:2009+A2:2016
Low-voltage fuses. Part 4 Supplementary requirements for fuse-links for the protection of semiconductor devices

BS EN 60269-6:2011
Low-voltage fuses. Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems

BS EN 60357:2003
Tungsten halogen lamps (non-vehicle). Performance specifications

BS EN 60400:2017
Lampholders for tubular fluorescent lamps and starterholders

BS EN 60432-1:2000+A2:2012
Safety specification for incandescent lamps. Part 1 Tungsten filament lamps for domestic and similar general lighting purposes

BS EN 60432-2:2000+A2:2012
Safety specification for incandescent lamps. Part 2 Tungsten halogen lamps for domestic and similar general lighting purposes

BS EN 60529:1992+A2:2013
Degrees of protection provided by enclosures (IP code)

BS EN 60570:2003+A1:2018
Electrical supply track systems for luminaires

BS EN 60598-1:2015+A1:2018
Luminaires. Part 1 General requirements and tests

BS EN 60598-2-2:2012
Luminaires. Part 2-2 Particular requirements. Recessed luminaires

BS EN 60598-2-3:2003+A1:2011
Luminaires. Part 2-3. Particular requirements. Luminaires for road and street lighting

BS EN 60598-2-4:2018
Luminaires. Particular requirements

BS EN 60598-2-5:2015
Luminaires. Part 2-5. Particular requirements. Floodlights

BS EN 60598-2-6:1995, IEC 60598-2-6:1994
Luminaires. Part 2-6. Particular requirements. Luminaires with built-in transformers for filament lamps

BS EN 60598-2-11:2013
Luminaires. Particular requirements. Aquarium luminaires

BS EN 60598-2-12:2013
Luminaires. Particular requirements. Mains socket-outlet mounted nightlights

BS EN 60598-2-13:2006+A2:2016
Luminaires. Particular requirements. Part 2-13 Ground recessed luminaires

BS EN 60598-2-14:2009
Luminaires. Particular requirements. Luminaires for cold cathode tubular discharge lamps (neon tubes) and similar equipment

BS EN 60598-2-18:1994+A1:2012
Luminaires. Part 2-18. Particular requirements. Luminaires for swimming pools and similar applications

BS EN 60598-2-20:2015
Luminaires. Particular requirements. Lighting chains

BS EN 60598-2-21:2015
Luminaires. Particular requirements. Rope lights

BS EN 60598-2-22:2014
Luminaires. Part 2-22. Particular requirements. Luminaires for emergency lighting

BS EN 60598-2-23:1997, IEC 60598-2-23:1996
Luminaires. Part 2-23. Particular requirements. Extra low voltage lighting systems for filament lamps

BS EN 60598-2-24:2013
Luminaires. Part 2-24 Particular requirements. Luminaires with limited surface temperatures

BS EN 60598-2-25:1995, IEC 60598-2-25:1994
Luminaires. Part 2-25. Particular requirements. Luminaires for use in clinical areas of hospitals and health care buildings

BS EN 60630:1998+A7:2015
Maximum lamp outliners for incandescent lamps

BS EN 60730-2-3:2007
Specification for automatic electrical controls for household and similar use. Part 2-3 Particular requirements for thermal protectors for ballasts for tubular fluorescent lamps

BS EN 60898-1:2003+A13:2012
Electrical accessories. Circuit-breakers for overcurrent protection for household and similar installations. Part 1 Circuit-breakers for a.c. operation

BS EN 60898-2:2006
Electrical accessories. Circuit-breakers for overcurrent protection for household and similar installations. Part 2 Circuit-breakers for a.c and d.c. operation

BS EN 60901:1996+A6:2017
Specification for single-capped fluorescent lamps. Performance specifications

BS EN 60921:2004
Ballasts for tubular fluorescent lamps. Performance requirements

BS EN 60923:2005
Auxiliaries for lamps. Ballasts for discharge lamps (excluding tubular fluorescent lamps). Performance requirements

BS EN 60927:2007+A1:2013
Auxiliaries for lamps. Starting devices (other than glow starters). Performance requirements

BS EN 60929:2011+A1:2016
AC and/or DC-supplied electronic control gear for tubular fluorescent lamps. Performance requirements

BS EN 60947-1:2007+A2:2014
Low-voltage switchgear and controlgear. Part 1 General rules

BS EN 60947-2:2017
Low-voltage switchgear and controlgear. Part 2 Circuit-breakers

BS EN 60947-3:2009+A2:2015
Low-voltage switchgear and controlgear. Part 3 Switches, disconnectors, switch-disconnectors and fuse-combination units

BS EN 60947-4-1:2010+A1:2012
Low-voltage switchgear and controlgear. Part 4-1 Contactors and motor-starters. Electromechanical contactors and motor-starters

BS EN 60947-4-2:2012
Low-voltage switchgear and controlgear. Part 4-2 Contactors and motor-starters. A.C. semiconductor motor controllers and starters

BS EN 60947-4-3:2014
Low-voltage switchgear and controlgear. Contactors and motor-starters. AC semiconductor controllers and contactors for non-motor loads

BS EN 60947-5-1:2017
Specification for low-voltage switchgear and controlgear. Part 5-1 Control/circuit devices and switching elements. Electromechanical control circuit devices

BS EN 60947-5-2:2007+A1:2012
Low-voltage switchgear and controlgear. Control circuit devices and switching elements. Proximity switches

BS EN 60947-5-3:2013
Low-voltage switchgear and controlgear. Control circuit devices and switching elements. Requirements

for proximity devices with defined behaviour under fault conditions (PDDB)

BS EN 60947-5-4:2003
Specification for low-voltage switchgear and controlgear. Part 5-4 Control circuit devices and switching elements. Method of assessing the performance of low-energy contacts. Special tests

BS EN 60947-5-5:1998+A2:2017
Low-voltage switchgear and controlgear. Part 5-5: Control circuit devices and switching elements - Electrical emergency stop device with mechanical latching function

BS EN 60947-5-6:2001
Specification for low-voltage switchgear and controlgear. Control circuit devices and switching elements. DC interface for proximity sensors and switching amplifiers (NAMUR). DC interface for proximity sensors and switching amplifiers (NAMUR)

BS EN 60947-5-7:2003
Specification for low-voltage switchgear and controlgear. Control circuit devices and switching elements. Requirements for proximity devices with analogue output

BS EN 60947-5-8:2006
Low-voltage switchgear and controlgear. Control circuit devices and switching elements. Three-position enabling switches

BS EN 60947-5-9:2007
Low-voltage switchgear and controlgear. Control circuit devices and switching elements. Flow rate switches

BS EN 60947-6-1:2005+A1:2014
Low-voltage switchgear and controlgear. Multiple function equipment. Transfer switching equipment

BS EN 60947-6-2:2003
Specification for low-voltage switchgear and controlgear. Part 6-2 Multiple function equipment. Control and protective switching devices (or equipment) (CPS)

BS EN 60947-7-1:2009
Low-voltage switchgear and controlgear. Ancillary equipment. Terminal blocks for copper conductors

BS EN 60947-7-2:2009
Low-voltage switchgear and controlgear. Ancillary equipment. Protective conductor terminal blocks for copper conductors

BS EN 60947-7-3:2009
Low-voltage switchgear and controlgear. Ancillary equipment. Safety requirements for fuse terminal blocks

BS EN 60947-7-4:2013
Low-voltage switchgear and controlgear. Ancillary equipment. PCB terminal blocks for copper conductors

BS EN 60947-8:2003+A2:2012
Specification for low-voltage switchgear and controlgear. Part 8 Control units for built-in thermal protection (PTC) for rotating electrical machines

BS EN 60968:2015
Self-ballasted fluorescent lamps for general lighting services. Safety requirements

BS EN 60969:1993
Self-ballasted lamps for general lighting services. Performance requirements

BS EN 61000-1-2:2016
Electromagnetic compatibility (EMC). General. Methodology for the achievement of functional safety of electrical and electronic systems including equipment with regard to electromagnetic phenomena

BS EN 61000-2-2:2002
Electromagnetic compatibility (EMC). Environment. Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems

BS EN 61000-2-4:2002
Electromagnetic compatibility (EMC). Environment. Compatibility levels in industrial plants for low-frequency conducted disturbances

BS EN 61000-2-9:1996
Electromagnetic compatibility (EMC). Environment. Description of HEMP environment. Radiated disturbance. Basic EMC publication

BS EN 61000-2-10:1999, IEC 61000-2-10:1998
Electromagnetic compatibility (EMC). Environment. Description of HEMP environment. Conducted disturbance

BS EN 61000-2-12:2003
Electromagnetic compatibility (EMC). Environment. Compatibility levels for low-frequency conducted disturbances and signalling in public medium-voltage power supply systems

BS EN 61000-3-2:2014
Electromagnetic compatibility (EMC). Limits. Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)

BS EN 61000-3-3:2013
Electromagnetic compatibility (EMC). Limits. Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

BS EN 61000-3-11:2001
Electromagnetic compatibility (EMC). Limits. Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems. Equipment with rated voltage current ≤ 75 A and subject to conditional connection

BS EN 61000-3-12:2011

Electromagnetic compatibility (EMC). Limits. Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and ≤ 75 A per phase

BS EN 61000-4-2:2009
Electromagnetic compatibility (EMC). Testing and measurement techniques. Electrostatic discharge immunity test

BS EN 61000-4-3:2006+A2:2010
Electromagnetic compatibility (EMC). Testing and measurement techniques. Radiated, radio-frequency, electromagnetic field immunity test

BS EN 61000-4-4:2012
Electromagnetic compatibility (EMC). Testing and measurement techniques. Electrical fast transient/burst immunity test

BS EN 61000-4-5:2006
Electromagnetic compatibility (EMC). Testing and measurement techniques. Surge immunity test

BS EN 61000-4-6:2014
Electromagnetic compatibility (EMC). Testing and measurement techniques. Immunity to conducted disturbances, induced by radio-frequency fields

BS EN 61000-4-7:2002+A1:2009
Electromagnetic compatibility (EMC). Testing and measurement techniques . General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto

BS EN 61000-4-8:2010
Electromagnetic compatibility (EMC). Testing and measurement techniques. Power frequency magnetic field immunity test

BS EN 61000-4-9:1994, IEC 61000-4-9:1993
Electromagnetic compatibility (EMC). Testing and measurement techniques. Pulse magnetic field immunity test. Basic EMC publication

BS EN 61000-4-10:2017
Electromagnetic compatibility (EMC). Testing and measurement techniques. Damped oscillatory magnetic field immunity test. Basic EMC publication

BS EN 61000-4-11:2004
Electromagnetic compatibility (EMC). Testing and measurement techniques. Voltage dips, short interruptions and voltage variations immunity tests

BS EN 61000-4-12:2006
Electromagnetic compatibility (EMC). Testing and measurement techniques. Ring wave immunity test

BS EN 61000-4-13:2002+A1:2009
Electromagnetic compatibility (EMC). Testing and measurement techniques. Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests

BS EN 61000-4-14:1999+A2:2009
Electromagnetic compatibility (EMC). Testing and measurement techniques. Voltage fluctuation immunity test for equipment with input current not exceeding 16 A per phase

BS EN 61000-4-15:2011
Electromagnetic compatibility (EMC). Testing and measurement techniques. Flickermeter. Functional and design specifications

BS EN 61000-4-16:1998+A2:2011
Electromagnetic compatibility (EMC). Testing and measurement techniques. Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz

BS EN 61000-4-17:1999+A2:2009, IEC 61000-4-17:1999
Electromagnetic compatibility (EMC). Testing and measurement techniques. Ripple on d.c. input power port immunity test

BS EN 61000-4-18:2007
Electromagnetic compatibility (EMC). Testing and measurement techniques. Damped oscillatory wave immunity test

BS EN 61000-4-19:2014
Electromagnetic compatibility (EMC). Testing and measurement techniques. Test for immunity to conducted, differential mode disturbances and signalling in the frequency range 2 kHz to 150 kHz at a.c. power ports

BS EN 61000-4-20:2010
Electromagnetic compatibility (EMC). Part 4-20 Testing and measurement techniques. Emission and immunity testing in transverse electromagnetic (TEM) waveguides

BS EN 61000-4-21:2011
Electromagnetic compatibility (EMC). Testing and measurement techniques. Reverberation chamber test methods

BS EN 61000-4-22:2011
Electromagnetic compatibility (EMC). Testing and measurement techniques. Radiated emission and immunity measurements in fully anechoic rooms (FARs)

BS EN 61000-4-23:2001
Electromagnetic compatibility (EMC). Testing and measurement techniques. Test methods for protective devices for HEMP and other radiated disturbances

BS EN 61000-4-24:1997
Electromagnetic compatibility (EMC). Testing and measurement techniques. Test methods for protective devices for HEMP conducted disturbance. Basic EMC publication

BS EN 61000-4-25:2002+A1:2012, IEC 61000-4-25:2001
Electromagnetic compatibility (EMC). Testing and measurement techniques. HEMP immunity test methods for equipment and systems

BS EN 61000-4-27:2000+A1:2009, IEC 61000-4-27:2000
Electromagnetic compatibility (EMC). Testing and measurement techniques. Unbalance, immunity test for equipment with input current not exceeding 16 A per phase

BS EN 61000-4-28:2000+A2:2009
Electromagnetic compatibility (EMC). Testing and measurement techniques. Variation of power frequency, immunity test for equipment with input current not exceeding 16 A per phase

BS EN 61000-4-29:2001
Electromagnetic compatibility (EMC). Testing and measurement techniques. Testing and measurement techniques. Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests.

BS EN 61000-4-30:2009
Electromagnetic compatibility (EMC). Testing and measurement techniques. Power quality measurement methods

BS EN 61000-4-30:2015
Electromagnetic compatibility (EMC). Testing and measurement techniques. Power quality measurement methods

BS EN 61000-4-34:2007+A1:2009
Electromagnetic compatibility (EMC). Testing and measurement techniques. Voltage dips, short interruptions and voltage variations immunity tests for equipment with mains current more than 16 A per phase

BS EN 61000-5-5:1996
Electromagnetic compatibility (EMC). Installation and mitigation guidelines. Specification of protective devices for HEMP conducted disturbance. Basic EMC publication

BS EN 61000-5-7:2001
Electromagnetic compatibility (EMC). Installation and mitigation guidelines. Installation and mitigation guidelines. Degrees of protection by enclosures against electromagnetic disturbances (EM code). Degrees of protection against electromagnetic disturbances provided by enclosures (EM code)

BS EN 61000-6-1:2007
Electromagnetic compatibility (EMC). Generic standards. Part 6-1 Immunity for residential, commercial and light-industrial environments

BS EN 61000-6-2:2005
Electromagnetic compatibility (EMC). Generic standards. Part 6-2 Immunity for industrial environments

BS EN 61000-6-3:2007+A1:2011
Electromagnetic compatibility (EMC). Generic standards. Part 6-3 Emission standard for residential, commercial and light-industrial environments

BS EN 61000-6-4:2007+A1:2011
Electromagnetic compatibility (EMC). Generic standards. Part 6-4 Emission standard for industrial

environments

BS EN 61000-6-5:2015
Electromagnetic compatibility (EMC). Generic standards. Immunity for equipment used in power station and substation environment

BS EN 61000-6-7:2015
Electromagnetic compatibility (EMC). Generic standards. Immunity requirements for equipment intended to perform functions in a safety-related system (functional safety) in industrial locations

BS EN 61008-1:2012+A12:2017
Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs). General rules

BS EN 61008-2-1:1995
Specification for residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs). Part 2-1 Applicability of the general rules to RCCBs functionally independent of line voltage

BS EN 61009-1:2012+A12:2016
Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBO's). Part 1 General rules

BS EN 61009-2-1:1995
Specification for residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs). Part 2-1 Applicability of the general rules to RCBOs functionally independent of line voltage

BS EN 61047:2004
D.C. or A.C. supplied electronic step-down convertors for filament lamps. Performance requirements

BS EN 61048:2006+A1:2016
Auxiliaries for lamps. Capacitors for use in tubular fluorescent and other discharge lamp circuits. General and safety requirements

BS EN 61049:1993
Specification for capacitors for use in tubular fluorescent and other discharge lamp circuits. Performance requirements

BS EN 61050:1992
Specification for transformers for tubular discharge lamps having a no-load output voltage exceeding 1000 V (generally called neon-transformers). General and safety requirements

BS EN 61184:2017
Bayonet lampholders

BS EN 61195:1999+A2:2015
Double-capped fluorescent lamps. Safety specifications

BS EN 61199:2011+A2:2015
Single-capped fluorescent lamps. Safety specifications

BS EN 61347-2-1:2001+A2:2014
Lamp controlgear. Part 2-1 Particular requirements for starting devices (other than glow starters)

BS EN 61347-2-2:2012
Lamp controlgear. Part 2-2 Particular requirements for D.C. or A.C. supplied electronic step-down convertors for filament lamps

BS EN 61347-2-3:2011+A1:2017
Lamp control gear. Part 2-3 Particular requirements for A.C. and/or D.C. supplied electronic control gear for fluorescent lamps

BS EN 61347-2-7:2012
Lamp controlgear. Part 2-7 Particular requirements for battery supplied electronic controlgear for emergency lighting (self-contained)

BS EN 61347-2-8:2001+A1:2006
Lamp controlgear. Part 2-8 Particular requirements for ballasts for fluorescent lamps

BS EN 61347-2-9:2013
Lamp controlgear. Part 2-9 Particular requirements for electromagnetic controlgear for discharge lamps (excluding fluorescent lamps)

BS EN 61347-2-13:2014+A1:2017
Lamp controlgear. Particular requirements for d.c. or a.c. supplied electronic controlgear for LED modules

BS EN 61439-1:2011
Low-voltage switchgear and controlgear assemblies. Part 1 General rules

BS EN 61439-2:2011
Low-voltage switchgear and controlgear assemblies. Power switchgear and controlgear assemblies

BS EN 61439-3:2012
Low-voltage switchgear and controlgear assemblies. Distribution boards intended to be operated by ordinary persons (DBO)

BS EN 61439-4:2013
Low-voltage switchgear and controlgear assemblies. Particular requirements for assemblies for construction sites (ACS)

BS EN 61439-5:2015
Low-voltage switchgear and controlgear assemblies. Assemblies for power distribution in public networks

BS EN 61439-6:2012

Low-voltage switchgear and controlgear assemblies. Busbar trunking systems (busways)

BS EN 61547:2009
Specification for equipment for general lighting purposes. EMC immunity requirements

BS EN 61549:2003
Miscellaneous lamps

BS EN 61558-1:2005+A1:2009
Safety of power transformers, power supplies, reactors and similar products. Part 1 General requirements and tests

BS EN 61558-2-1:2007
Safety of power transformers, power supplies, reactors and similar products. Part 2-1 Particular requirements and tests for separating transformers and power supplies incorporating separating transformers for general applications

BS EN 61558-2-2:2007
Safety of power transformers, power supplies, reactors and similar products. Part 2-2 Particular requirements and tests for control transformers and power supplies incorporating control transformers

BS EN 61558-2-3:2010
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for ignition transformers for gas and oil burners

BS EN 61558-2-4:2009
Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V. Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers

BS EN 61558-2-5:2010
Safety of transformers, reactors, power supply units and combinations thereof. Part 2-5 Particular requirements and tests for transformer for shavers, power supply units for shavers and shaver supply units

BS EN 61558-2-6:2009
Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V. Part 2-6 Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers

BS EN 61558-2-8:2010
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for transformers and power supply units for bells and chimes

BS EN 61558-2-9:2011
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for transformers and power supply units for class III handlamps for tungsten filament lamps

BS EN 61558-2-10:2014

Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for separating transformers with high insulation level and separating transformers with output voltages exceeding 1 000 V

BS EN 61558-2-12:2011
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for constant voltage transformers and power supply units for constant voltage

BS EN 61558-2-13:2009
Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V. Particular requirements and tests for auto transformers and power supply units incorporating auto transformers

BS EN 61558-2-14:2013
Safety of transformers, reactors, power supply units and combination thereof. Particular requirements and tests for variable transformers and power supply units incorporating variable transformers

BS EN 61558-2-15:2012
Safety of transformers, reactors, power supply units and combinations thereof. Part 2-15 Particular requirements and tests for isolating transformers for the supply of medical locations

BS EN 61558-2-16:2009+A1:2013
Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V. Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units

BS EN 61558-2-20:2011
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for small reactors

BS EN 61558-2-23:2010
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for transformers and power supply units for construction sites

BS EN 61558-2-26:2013
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for transformers and power supply units for saving energy and other purposes

BS EN 62031:2008+A2:2015
LED modules for general lighting. Safety specifications

BS EN 62035:2014
Discharge lamps (excluding fluorescent lamps). Safety specifications

BS EN 62262:2002
Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)

BS EN 62384:2006+A1:2009

DC or AC supplied electronic control gear for LED modules. Performance requirements

BS EN 62386-207:2009
Digital addressable lighting interface. Particular requirements for control gear. LED modules (device type 6)

BS EN 62442-1:2011
Energy performance of lamp controlgear. Controlgear for fluorescent lamps. Method of measurement to determine the total input power of controlgear circuits and the efficiency of the controlgear

BS EN 62442-2:2014
Energy performance of lamp controlgear. Controlgear for high intensity discharge lamps (excluding fluorescent lamps). Method of measurement to determine the efficiency of the controlgear

BS EN 62612:2013+A2:2018
Self-ballasted LED lamps for general lighting services with supply voltages $0G 50 V. Performance requirements

BS EN 62722-1:2016
Luminaire performance. General requirements

BS EN 62722-2-1:2016
Luminaire performance. Particular requirements for LED luminaires

BS EN 62838:2016
LEDsi lamps for general lighting services with supply voltages not exceeding 50 V a.c. r.m.s. or 120 V ripple free d.c. Safety specifications

BS EN 62868:2015
Organic light emitting diode (OLED) panels for general lighting. Safety requirements

BS EN 62922:2017
Organic light emitting diode (OLED) panels for general lighting. Performance requirements

BS EN ISO 11149:1997
Optics and optical instruments. Lasers and laser related equipment. Fibre optic connectors for non-telecommunication laser applications

Y74 ACCESSORIES FOR ELECTRICAL SERVICES

1010 APPLICATION:
Supply fixed electrical wiring accessories for use with fixed and portable peripheral equipment using either power or signalling cables.

1020 SAMPLES:
Submit samples of proposed materials and equipment for approval before work is started. Label each sample with name, catalogue number and reference to the use or services.

2000 PRODUCTS/MATERIALS

2010A ACCESSORIES COMMON REQUIREMENTS - WHITE PLASTIC PLATES GRID, FLUSH INSTALLATION:
- Area of installation - Interior.
- Enclosure pattern - Flush.
- Accessory mounting
  - Adjustable steel grid for grid switches or direct to enclosure for all other accessories.
- Enclosure material - Pressed steel.
- Enclosure finish - Galvanized.
- cover plate finish, all accessories to match
  - Moulded plastic, colour - white.
- cover plate pattern - Overlapping; with architrave where indicated.
- Ancillaries
  - Earthing terminal integral within switch box.
  - Neon indicator with red lens, illuminated in "ON" position, for connection units.
  - Switch rocker bar colour - white.
  - Operating keys for key operated switches, minimum number 2.
  - Fuses to BS 1362.
  - Blank inserts for spare ways on grid switches.
- Marking
  - Method - engraving. Mark front plate to indicate equipment served on connection units.
- Conduit and cable entries
  - Knockouts side, top and rear.
- Cable termination - Manufacturer's standard.

2010B ACCESSORIES COMMON REQUIREMENTS - MATT CHROME FINISH METAL PLATES, FLUSH INSTALLATION:
- Area of installation - Interior.
- Enclosure pattern - Flush.
- Accessory mounting
  - Adjustable steel grid for grid switches or direct to enclosure for all other accessories.
- Enclosure material - Pressed steel.
- Enclosure finish - Galvanized.
- cover plate finish, all accessories to match
  - Brass with matt chrome surface.
- cover plate pattern - Overlapping; with architrave where indicated.
- Ancillaries
  - Earthing terminal integral within switch box.
  - Neon indicator with red lens, illuminated in "ON" position, for connection units.
  - Switch rocker bar colour as indicated.
  - Operating keys for key operated switches, minimum number 2.
  - Fuses to BS 1362.
  - Blank inserts for spare ways on grid switches.
- Marking

  - Method - engraving. Mark front plate to indicate equipment served on connection units.
- Conduit and cable entries
  - Knockouts side, top and rear.
- Cable termination - Manufacturer's standard.

2010C ACCESSORIES COMMON REQUIREMENTS - WHITE PLASTIC PLATES, EMBEDDED CABLES, SURFACE INSTALLATION:
- Area of installation - Interior.
- Enclosure pattern - Surface.
- Accessory mounting - Direct to enclosure.
- Enclosure material - White moulded plastic.
- cover plate finish, all accessories to match
  - Moulded plastic, colour - white.
- cover plate pattern - Surface type.
- Ancillaries
  - Earthing terminal integral within switch box.
  - Neon indicator with red lens, illuminated in "ON" position, for connection units.
  - Switch rocker bar colour as indicated.
  - Operating keys for key operated switches, minimum number 2.
  - Fuses to BS 1362.
- Marking
  - Method - engraving. Mark front plate to indicate equipment served on connection units.
- Conduit and cable entries
  - Knockouts side, top and rear.
- Cable termination - Manufacturer's standard.

2010D ACCESSORIES COMMON REQUIREMENTS - METAL CLAD PLATES, SURFACE STEEL CONDUIT INSTALLATION:
- Area of installation - Interior.
- Enclosure pattern - Surface.
- Accessory mounting - Direct to enclosure.
- Enclosure material
  - Pressed steel or cast iron.
- Enclosure finish
  - As conduit system or galvanized.
- cover plate finish, all accessories to match
  - Metal clad.
- cover plate pattern - Surface type.
- Ancillaries
  - Earthing terminal integral within switch box.
  - Neon indicator with red lens, illuminated in "ON" position, for connection units.
  - Switch rocker bar colour as indicated.
  - Operating keys for key operated switches, minimum number 2.
  - Fuses to BS 1362.
- Marking
  - Method - engraving. Mark front plate to indicate equipment served on connection units.
- Conduit and cable entries
  - Threaded entries, top, bottom or side to suit conduit system.
- Cable termination - Manufacturer's standard.

2010E ACCESSORIES COMMON REQUIREMENTS - SURFACE, STEEL CONDUIT, WEATHERPROOF INSTALLATION:
- Area of installation - Exterior.
- Enclosure pattern - Surface and weatherproof.
- Accessory mounting - Direct to enclosure.
- Enclosure material - Cast iron.

- Enclosure finish - As conduit system or galvanized.
- cover plate finish, all accessories to match
  - As enclosure.
- cover plate pattern - Surface type.
- Ancillaries
  - Earthing terminal integral within switch box.
  - Neon indicator with red lens, illuminated in "ON" position, for connection units.
  - Screwed weathering cap and chain for socket outlets.
  - Operating keys for key operated switches, minimum number 2.
  - Fuses to BS 1362.
- Marking
  - Method - engraving. Mark front plate to indicate equipment served on connection units.
- Conduit and cable entries
  - Threaded entries, top, bottom or side to suit conduit system.
- Cable termination - Manufacturer's standard.

2010F ACCESSORIES COMMON REQUIREMENTS - SURFACE, PLASTIC, WEATHERPROOF INSTALLATION:
- Area of installation - Exterior.
- Enclosure degree of protection to BS EN 60529, IP54.
- Enclosure pattern - Surface and weatherproof.
- Accessory mounting - Direct to enclosure.
- Enclosure material - Impact resistant plastic.
- Enclosure finish - Natural or self coloured.
- cover plate finish, all accessories to match
  - Moulded plastic, colour as indicated.
- cover plate pattern - Surface type.
- Ancillaries
  - Earthing terminal integral within switch box.
  - Neon indicator with red lens, illuminated in "ON" position, for connection units.
  - Protective shrouds to rocker bars.
  - Screwed weathering cap and chain for socket outlets.
  - Switch rocker bar colour as indicated.
  - Operating keys for key operated switches, minimum number 2.
  - Fuses to BS 1362.
- Conduit and cable entries
  - Threaded entries to suit cable/conduit system.
- Cable termination - Manufacturer's standard.

2010G ACCESSORIES COMMON REQUIREMENTS - BRONZE FINISH METAL PLATES GRID, FLUSH INSTALLATION:
- Area of installation - Interior.
- Enclosure pattern - Flush.
- Accessory mounting
  - Adjustable steel grid for grid switches or direct to enclosure for all other accessories.
- Enclosure material - Pressed steel.
- Enclosure finish - Galvanized.
- cover plate finish, all accessories to match
  - Brass with BMA/bronze surface.
- cover plate pattern - Overlapping; with architrave where indicated.
- Ancillaries
  - Earthing terminal integral within switch box.
  - Neon indicator with red lens, illuminated in "ON" position, for connection units.
  - Switch rocker bar colour as indicated.
  - Operating keys for key operated switches, minimum number 2.
  - Fuses to BS 1362.

  - Blank inserts for spare ways on grid switches.
- Marking
  - Method - engraving. Mark front plate to indicate equipment served on connection units.
- Conduit and cable entries
  - Knockouts side, top and rear.
- Cable termination - Manufacturer's standard.

2020A INTERIOR LIGHTING SWITCHES - GENERAL PURPOSE MOULDED PLASTIC:
- Standard
  - BS EN 60669-1
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.
- Switch type - Rocker bar - moulded plastic.
- Rating - 10AX minimum.
- Gangs as indicated.
- Switch mechanism - Snap action microgap.
- Pole configurations
  - Single pole.
  - Double pole.
  - 2 way.
  - Intermediate.

2020B INTERIOR LIGHTING SWITCHES - GRID MOULDED PLASTIC:
- Standard
  - BS EN 60669-1
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.
- Switch type - Rocker bar - moulded plastic.
- Rating - 10AX minimum.
- Switch mechanism - Snap action microgap.
- Pole configurations
  - Single pole.
  - 1 way.
  - 2 way.
  - Intermediate.

2020C INTERIOR LIGHTING SWITCHES - PULL CORD:
- Standard
  - BS EN 60669-1
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.
- Switch type - Cord to BS EN 61058-2-1
- Rating - 10AX minimum.
- Pole Configurations
  - Single pole.
  - Double pole.

2020D INTERIOR LIGHTING SWITCHES - GENERAL PURPOSE SECRET KEY:
- Standard
  - BS EN 60669-1
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.
- Switch type - Rocker bar - secret key.
- Rating - 10AX minimum.
- Gangs as indicated.
- Switch mechanism - Snap action microgap.
- Pole configurations
  - Single pole.

- Double pole.
- 2 way.
- Intermediate.

2020E INTERIOR LIGHTING SWITCHES - GENERAL PURPOSE DIMMER:

- Standard
  - BS EN 60669-1
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.
- Switch type - Rocker bar - dimmer.
- Rating - 10AX minimum.
- Gangs as indicated.
- Switch mechanism - Snap action microgap.
- Pole configurations
  - Single pole.
  - Double pole.
  - 2 way.
  - Intermediate.

2020F INTERIOR LIGHTING SWITCHES - GRID SECRET KEY:

- Standard
  - BS EN 60669-1
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.
- Switch type - Rocker bar - secret key.
- Rating - 10AX minimum.
- Switch mechanism - Snap action microgap.
- Pole configurations
  - Single pole.
  - 1 way.
  - 2 way.
  - Intermediate.

2030A EXTERIOR LIGHTING SWITCHES - METAL CLAD ROTARY:

- Standard
  - BS EN 60669-1
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.
- Switch type - Rotary disc or lever operating through sealing gland.
- Rating - 6A.
- Rating - 10AX minimum.
- Gangs as indicated.
- Action - Two position.
- Pole configurations as indicated.

2030B EXTERIOR LIGHTING SWITCHES - SEALED ROCKER BAR:

- Standard
  - BS EN 60669-1
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.
- Switch type - Rocker bar with sealed in plastic membrane.
- Rating - 6A.
- Rating - 10AX minimum.
- Gangs as indicated.
-
- Action - Two position.
- Pole configurations as indicated.

2040# TIME SWITCHES:

2040A TIME SWITCHES - 24 HOUR:
- Wire timer and switch circuits to separate terminals.
- Standard - BS EN 60730-2-7.
- Time switch type - Quartz stabilized solid state 50 hour nickel cadmium battery backup.
- Contacts duty - Inductive.
- Contacts rating - 15A.
- Special programme facilities
  - Number of 'ON' and 'OFF' operations - 4.
- Programme repeat cycle - 24 hour.

2040B TIME SWITCHES - 7 DAY:
- Wire timer and switch circuits to separate terminals.
- Standard - BS EN 60730-2-7.
- Time switch type
  - Quartz stabilized solid state 50 hour nickel cadmium battery backup.
- Contacts duty - Inductive.
- Contacts rating - 15A.
- Special programme facilities
  - Number of "ON" and "OFF" operations - 4.
- Programme repeat cycle - 7 day.

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2050A LUMINAIRE CONNECTORS - GENERAL AND EMERGENCY LIGHTING:
- Rating - 2A.
- Connector type
  - Fixed terminal strip, screw cover and cord grip to BS 67.
- Load carrying capacity to match selected luminaire.

2050B LUMINAIRE CONNECTORS - GENERAL LIGHTING:
- Rating - 2A.
- Connector type
  - 3 pin plug/socket to BS 546.
- Load carrying capacity to match selected luminaire.

2050C LUMINAIRE CONNECTORS - CORD GRIP GENERAL AND EMERGENCY LIGHTING:
- Rating - 2A.
- Connector type
  - Cord grip type plug/socket and screw on retaining cover to BS 5733 3 pin or 4 pin.
- Load carrying capacity to match selected luminaire.

2060A LAMPHOLDERS - BC TYPE:
- Standard - BS EN 61184.
- Lampholder type
  - Bayonet clip.
  - B22.
- Fixing - Bracket
  - Straight.
  - Angle.
  - Suspension.

- Finish - Manufacturer's standard.
- Material - Heat resistant moulded plastic.
- Ancillaries
  - Cord grip.
  - Lampshade ring.
  - Protective lampshade ring.

2060B LAMPHOLDERS - ES TYPE:
- Standard - BS EN IEC 60238.
- Lampholder type
  - Edison screw.
  - E27.
- Fixing - Bracket
  - Straight.
  - Angle.
  - Suspension.
- Finish - Manufacturer's standard.
- Material - Heat resistant moulded plastic.
- Ancillaries
  - Cord grip.
  - Lampshade ring.
  - Protective lampshade ring.

2060C LAMPHOLDERS - BC TYPE WITH ENHANCED SAFETY:
- Standard
  - BS EN 61184
  - BS 7895
- Lampholder type - bayonet clip B22.
- Fixing - Bracket
  - Straight.
  - Angled.
  - Suspension.
- Finish - manufacturer's standard.
- Ancillaries
  - Cord grip.
  - Lamp shade ring.
  - Protective lampshade ring.

2070A ISOLATING SWITCHES - BS EN 60669-1:
- Provide isolating switches for fixed appliances.
- Utilization category as indicated.
- Making capacity as indicated.
- Standard
  - BS EN 60669-1
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.
- Switch type - Rocker bar.
- Rating as indicated on schedule.
- Pole configuration
  - DP.
  - Three pole.
  - TPN.

2070B ISOLATING SWITCHES - BS EN 60947-3:
- Provide isolating switches for fixed appliances.
- Utilization category as indicated on schedule.

- Making capacity as indicated.
- Standard
  - Enclosure box - BS 4662, BS 5733 or BS EN 60670-1, BS EN 60947-3.
  - Isolation during repair and maintenance - BS EN 62626-1
- Switch type - Rocker bar.
- Rating as indicated on schedule.
- Pole configuration
  - DP.
  - Three pole.
  - TPN.

  -

2080A FUSE CONNECTION UNITS - SWITCHED:
- Standard
  - BS 1363-4
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate, and switched.
- Unit type - Rocker bar - plastic.
-
- Pole configuration - DP.
- Ancillaries

-
- Cord outlet.
  - Secret cord outlet.
  - Cord grip and fuse.
  - Lockable fuse carrier.
- Provide appropiately overload rated fuse for equipment supplied.

2080B FUSE CONNECTION UNITS - UNSWITCHED:
- Standard
  - BS 1363-4
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate, and unswitched.
- Pole configuration - DP.
- Ancillaries
  - Cord outlet
  - Cord grip and fuse.
  - Lockable fuse carrier.

2090A SOCKET-OUTLETS - SINGLE, SWITCHED:
- Standard
  - 13A socket-outlet to BS 1363-2.
  - Plug tops to BS 1363-1.
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.
- Switching - Switched.
- Switch type - Rocker bar - plastic.
- Rating - 13A.
- Ancillaries
  - Plug tops 25% of number of sockets, fused as indicated.
- Gangs - 1.

2090B SOCKET-OUTLETS - SINGLE WITH INTEGRAL RCD, SWITCHED:
- Standard

- Socket outlet to BS 1363-2.
- Plug tops to BS 1363-1.
- RCD to BS 7288
- Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.
- Switching - Switched
- Switch type - Rocker bar - plastic.
- Rating - 13A.
- Ancillaries
  - RCD with residual current rating 30 mA.
  - Plug tops 25% of number of sockets, fused as indicated.
- Gangs - 1.

2090C SOCKET-OUTLETS - DOUBLE SWITCHED:
- Standard
  - 13A socket-outlet to BS 1363-2.
  - Plug tops to BS 1363-1.
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.
- Switching - Switched
- Switch type - Rocker bar - plastic.
- Rating - 13A.
- Ancillaries
  - Plug tops 25% of number of sockets, fused as indicated.
- Gangs - 2.

2090D SOCKET-OUTLETS - SINGLE, UNSWITCHED:
- Standard
  - Socket-outlet to BS 1363-2.
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.
- Switching - Unswitched.
- Rating - 13A.
- Gangs - 1

2090E SOCKET-OUTLETS - SINGLE WITH INTEGRAL RCD, UNSWITCHED:
- Standard
  - Socket outlet to BS 1363-2.
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.
  - RCD to BS 7288.
  - HBES systems BS EN 50428 or BS EN 60669-2-5.
- Switching - Unswitched.
- Rating - 13A.
- Ancillaries
  - RCD with residual current rating 30 mA.
- Gangs - 1.

2090F SOCKET-OUTLETS - DOUBLE WITH INTEGRAL USB CHARGING, SWITCHED:
- Standard
  - Socket-outlet to BS 1363-2 (2016 or later).
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.
  - HBES systems to BS EN 50428 or BS EN 60669-2-5.
  - USB charging in accordance with BS EN 62680-1-1
- Switching - Switched.
- Rating - 13 A.
- Ancillaries
  - Two USB charging socket-outlets
- Gangs - 2.

2090G SOCKET-OUTLETS - SINGLE WITH INTEGRAL USB CHARGING, SWITCHED:

- Standard
  - Socket-outlet to BS 1363-2 (2016 or later).
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.
  - HBES systems to BS EN 50428 or BS EN 60669-2-5.
  - USB battery charging in accordance with BS EN 62680-1-1
- Switching - Switched.
- Rating - 13 A.
- Ancillaries
  - Two USB charging socket-outlets
- Gangs - 1.

2090H SOCKET-OUTLETS - INDUSTRIAL, UNSWITCHED:

- Standard
  - Socket-outlet to BS EN 60309-2.
  - Enclosure box to BS 5733 or BS EN 60670-1 as appropriate
- Switching - Unswitched.
- Voltage, poles, interlocking and BS EN 60529 ingress protection rating
  - As per relevant schedule.
  - Ensure socket-outlets have an ingress protection rating not less than IP44.
  - Ensure socket-outlets for use outdoors or in areas with sprays, water jets or excessive splashing have an ingress protection rating of not less than IP66

2090I SOCKET-OUTLETS - INDUSTRIAL, SWITCHED:

- Standard
  - Socket-outlet to BS EN 60309-2, switched socket-outlet assembly BS EN 60309-4.
  - Enclosure box to BS EN 60309-4, BS 5733 or BS EN 60670-1 as appropriate.
  - Isolation provided for use during repair and maintenance in accordance with BS EN 62626-1
- Switching - Switched.
- Voltage, poles and BS EN 60529 ingress protection rating
  - As per schedule.
  - Ensure socket-outlets have an ingress protection rating not less than IP44.
  - Ensure socket-outlets for use outdoors or in areas with sprays, water jets or excessive splashing have an ingress protection rating of not less than IP66
- Ancillaries and interlocking
  - As per relevant schedule.

2095A DUAL USB CHARGING OUTLETS:

- Standard
  - Electrical safety to BS EN 62368-1 or BS EN 60950-1.
  - Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.
  - HBES systems to BS EN 50428 or BS EN 60669-2-5.
  - USB battery charging in accordance with BS EN 62680-1-1
- Supply voltage: AC 230 V 50 Hz.
- USB charging socket-outlets
  - Quantity - 2.
  - Output voltage and current to BS EN 62680-1
- Ensure that the BS EN 60664-1 installation overvoltage category is suitable for the intended installation conditions at the point of connection to the fixed installation in accordance with BS 7671 (IET Wiring Regulations).

2100B COOKER CONTROL UNIT - WITHOUT SOCKET:
- Standard
  - BS 4177
  - Enclosure box to BS 4662, BS 5773 or BS EN 60670-1 as appropriate.
- Unit type - With pilot lamp.
- Pole configuration - DP.
- Rating - 45A.

2110A CORD OUTLETS - COOKER CONNECTION UNIT:
- Standard
  - BS 5733
  - Enclosure box to BS 4662
- Format - Cooker connection.
- Rating - 45A
- Pole configuration - DP&E.

2120A CABLE AND APPLIANCE COUPLERS - 16A, 240V SINGLE-PHASE, GENERAL PURPOSE:
- Standard
  - BS EN 60309-2
- Material - Polycarbonate male and female connectors.
- Rating - Voltage 220 - 240V; Current 16A.
- Configuration - 2PE.
- Colour - 220 - 240V, Blue.
- Ancillaries as indicated.
  - ON/OFF switch; gang combinations 1, 2, 3 and 4; RCD. BS 7288 sensitivity 30mA.

2130A TELEPHONE AND DATA OUTLET SOCKETS - GENERAL PURPOSE:
- Standard
  - For jack socket to telephone service provider requirements and enclosure box to BS 4662.
- Size - Standard.
- Circuit configurations as indicated.

2140A TELEPHONE CORD OUTLETS - GENERAL PURPOSE:
- Standard - BABT approved.
- Circuit configurations - Single or twin as indicated.

2170A AERIAL SOCKETS - TV AND DAB AERIALS:
- Circuit configurations - Dual TV and DAB.
- Ancillaries
  - Safety isolation to CAI recommendations for communal aerial systems.

2170B AERIAL SOCKETS - SINGLE TV AERIALS:
- Circuit configurations - Single TV.
- Ancillaries
  - Safety isolation to CAI recommendations for communal aerial systems.

2190A SHAVER POINTS - BATHROOM AND WASHROOM USE:
- Provide shaver points, internally switched by plug insertion.
- Standard

- BS EN 61558-2-5.
- Enclosure box to BS 4662, BS 5733 or BS EN 60670-1 as appropriate.

- Components
  - Double wound single-phase transformer 230/230V and 110V
  - Internal overload protection.
- Outlet compatibility for:
  - UK shaver plugs to BS 4573.

3000 WORKMANSHIP

3010 EARTHING:

- Ensure metal framework of equipment is bonded to main earth point. Ensure that cable CPC's are connected to earth bar.
- Provide earth CPC between earth lug on metal box and accessory casing except where accessory is encased in plastic.

3020 PROTECTION:

- Ensure there is no physical or electrical damage to accessories when they are removed from their packaging and during installation.
- Provide masking covers for surface mounted accessories to protect surface from paint.

Where accessories are flush mounted install front plate after painting is finished.

3030 FIXING:

- Align accessories horizontally and vertically. Where accessories are grouped, mount horizontally in line and parallel to each other and equidistant.
- Fix cover plates to boxes with brass fixing screws.

3040 MEASURING MOUNTING HEIGHTS:

- Take measurement for position of electrical accessories to the centre line of equipment from either finished floor or worktop. Where specified height coincides with top of tiling, leave a clear gap of 50mm above tiling.
- Mount equipment below a worktop 100mm below underside of worktop.

3050 STANDARD WALL-MOUNTED ACCESSORIES MOUNTING HEIGHTS:

- Ensure mounting heights for sockets and accessories comply with the following standards as relevant to the use of the building:
  - Approved Document M Volume 1
  - Approved Document M Volume 2
  - BS 8300-1 and BS 8300-2
  - IET Guidance Note 1: Selection and Erection
- Unless stated otherwise in drawings or schedules:
  - For rooms and circulation areas in dwellings, and office, reception and general circulation areas of other premises, use the following preferred standard mounting heights for wall-mounted accessories:

Accessory	Location	Height in rooms and circulation areas in dwellings (mm)	Height in office and general circulation areas (mm)
Lighting switch, dimmer, etc.		1200 AFFL to top of accessory	1000 AFFL to centre of accessory
Socket outlet	General	450 AFFL to bottom of accessory	450 AFFL to bottom of accessory
	Kitchen not above work surface	1000 AFFL to top of accessory	1000 AFFL to top of accessory
	Above work surface	150 above surface to	200 above surface to

		bottom of accessory	bottom of accessory
Shaver socket outlet		1000 AFFL to top of accessory	1000 AFFL to bottom of accessory
Fused connection unit	General	450 AFFL to bottom of accessory	450 AFFL to bottom of accessory
	Above work surface	150 above surface to bottom of accessory	200 above surface to bottom of accessory
Fused connection unit	Radiator heater, wall, with pullcord control	1800 AFFL to top of accessory	1800 AFFL to top of accessory
	Radiator heater, wall, controlled by switched fused connection unit	1200 AFFL to top of accessory	1000 AFFL to bottom of accessory
	Radiator heater, focal point	450 AFFL to bottom of accessory	450 AFFL to bottom of accessory
	Tubular heater	450 AFFL to bottom of accessory	450 AFFL to bottom of accessory
	Clock	1900 AFFL to top of accessory	1900 AFFL to top of accessory
Cooker control unit	Above work surface	150 above surface to centre of accessory	200 above surface to centre of accessory (unless on 45^0 fillet)
Cooker connection unit	Freestanding cookers	600 AFFL to bottom of accessory	600 AFFL to bottom of accessory
Room thermostat	Without user control or display	1400 AFFL to top of accessory	1400 AFFL to top of accessory
	With user control or display	1000 AFFL to top of accessory	1000 AFFL to top of accessory
Telephone outlet	Master Socket	Between 450 to bottom, and 1200 to top, of accessory AFFL	Between 450 and 1000 to bottom of accessory AFFL
	Slave or general purpose sockets	450 AFFL to bottom of accessory	450 AFFL to bottom of accessory
Radio/TV outlet	General purpose	450 AFFL to bottom of accessory	450 AFFL to bottom of accessory
	Behind wall-mounted appliance	As per drawing	As per drawing
Push button		1200 AFFL to top of accessory	1000 AFFL to centre of accessory
Fire Alarm manual call point		1200 AFFL to top of accessory	1000 AFFL to centre of accessory

Note - AFFL denotes Above finished floor level

- For other areas, provide common mounting heights for accessories of a similar type and function, considering the function of the accessory, its use in the workplace, facility or infrastructure, and any risks to health, safety and welfare.

3070 ACCESSORIES MOUNTING HEIGHTS:

- Provide switches and socket outlets for lighting and other equipment in habitable rooms at appropriate heights between 450mm and 1200mm from finished floor level, in accordance with Building Regulations Approved Document M, BS 8300-1 and BS 8300-2.

BS APPENDIX

BS 67:1987
Specification for ceiling roses

BS 546:1950

Specification. Two-pole and earthing-pin plugs, socket-outlets and socket-outlet adaptors.
If required, see also Supplement No 1:1960 Specification for plugs made of resilient material

BS 1362:1973
Specification for general purpose fuse links for domestic and similar purposes (primarily for use in plugs)

BS 1363-1:2016+A1:2018
13 A plugs, socket-outlets, adaptors and connection units. Specification for rewirable and non-rewirable 13 A fused plugs

BS 1363-2:2016+A1:2018
13 A plugs, socket-outlets, adaptors and connection units. Specification for 13 A switched and unswitched socket-outlets

BS 1363-4:2016+A1:2018
13 A plugs, socket-outlets, adaptors and connection units. Specification for 13 A fused connection units switched and unswitched

BS 2950:1958
Specification. Cartridge fuse-links for telecommunication and light electrical apparatus.

BS 4177:1992
Specification for cooker control units

BS 4573:1970+A5:2016
Specification for 2-pin reversible plugs and shaver socket-outlets

BS 4662:2006+A1:2009
Boxes for flush mounting of electrical accessories. Requirements, test methods and dimensions

BS 5733:2010+A1:2014
General requirements for electrical accessories. Specification

BS 7288:2016
Specification for residual current devices with or without overcurrent protection for socket-outlets for household and similar uses

BS 7671:2018
Requirements for electrical installations. IET Wiring Regulations

BS 7895:1997
Specification for bayonet lampholders with enhanced safety

BS 8300-1:2018
Design of an accessible and inclusive built environment. External environment. Code of practice

BS 8300-2:2018

Design of an accessible and inclusive built environment. Buildings. Code of practice

BS EN 50075:1991
Specification for flat non-wirable two-pole plugs 2.5 A 250 V, with cord, for the connection of class II-equipment for household and similar purposes

BS EN 50083-8:2013
Cable networks for television signals, sound signals and interactive services. Electromagnetic compatibility for networks

BS EN 50083-9:2002
Cabled distribution systems for television and sound signals. Part 9 Interfaces for CATV/SMATV headends and similar professional equipment for DVB/MPEG-2 transport streams

BS EN 50428:2005+A2:2009
Switches for household and similar fixed electrical installations. Collateral standard. Switches and related accessories for use in home and building electronic systems (HBES)

BS EN 60073:2002
Basic and safety principles for man-machine interface, marking and identification. Coding principles for indicators and actuators

BS EN 60309-1:1999+A2:2012, IEC 60309-1:1999
Plugs, socket-outlets and couplers for industrial purposes. Part 1 General requirements

BS EN 60309-2:1999+A2:2012, IEC 60309-2:1999
Plugs, socket-outlets and couplers for industrial purposes. Part 2 Dimensional interchangeability requirements for pin and contact-tube accessories

BS EN 60309-4:2007+A1:2012
Plugs, socket-outlets and couplers for industrial purposes. Part 4 Switched socket-outlets and connectors, with or without interlock

BS EN 60320-2-2:1999
Appliance couplers for household and similar general purposes. Part 2-2 Specification of requirements for individual types of coupler. Interconnection couplers for household and similar equipment

BS EN 60400:2017
Lampholders for tubular fluorescent lamps and starterholders

BS EN 60529:1992+A2:2013
Degrees of protection provided by enclosures (IP code)

BS EN 60664-1:2007
Insulation coordination for equipment within low-voltage systems. Part 1 Principles, requirements and tests

BS EN 60669-1:2018

Switches for household and similar fixed-electrical installations. Part 1 General requirements

BS EN 60669-1:2018
Switches for household and similar fixed-electrical installations. Part 1 General requirements

BS EN 60669-2-1:2004+A12:2010
Switches for household and similar fixed electrical installations. Part 2-1 Particular requirements. Electronic switches

BS EN 60669-2-2:2006
Switches for household and similar fixed electrical installations. Part 2-2 Particular requirements. Electromagnetic remote-control switches (RCS)

BS EN 60669-2-3:2006
Switches for household and similar fixed electrical installations. Part 2-3 Particular requirements. Time-delay switches (TDS)

BS EN 60669-2-4:2005
Switches for household and similar fixed electrical installations. Part 2-4 Particular requirements. Isolating switches

BS EN 60669-2-4:2005
Switches for household and similar fixed electrical installations. Part 2-4 Particular requirements. Isolating switches

BS EN 60669-2-5:2016
Switches for household and similar fixed electrical installations. Particular requirements. Switches and related accessories for use in home and building electronic systems (HBES)

BS EN 60669-2-5:2016
Switches for household and similar fixed electrical installations. Particular requirements. Switches and related accessories for use in home and building electronic systems (HBES)

BS EN 60669-2-6:2012
Switches for household and similar fixed electrical installations. Particular requirements. Fireman's switches for exterior and interior signs and luminaires

BS EN 60670-1:2005+A1:2013
Boxes and enclosures for electrical accessories for household and similar fixed electrical installations. Part 1 General requirements

BS EN 60670-1:2005+A1:2013
Boxes and enclosures for electrical accessories for household and similar fixed electrical installations. Part 1 General requirements

BS EN 60670-21:2007
Boxes and enclosures for electrical accessories for household and similar fixed electrical installations. Particular requirements for boxes and enclosures with provision for suspension means

BS EN 60670-22:2006
Boxes and enclosures for electrical accessories for household and similar fixed electrical installations. Part 22 Particular requirements for connecting boxes and enclosures

BS EN 60670-23:2008
Boxes and enclosures for electrical accessories for household and similar fixed electrical installations. Part 23 Particular requirements for floor boxes and enclosures

BS EN 60670-24:2013
Boxes and enclosures for electrical accessories for household and similar fixed electrical installations. Particular requirements for enclosures for housing protective devices and other power dissipating electrical equipment

BS EN 60728-11:2010
Cable networks for television signals, sound signals and interactive services. Part 11 Safety

BS EN 60730-2-7:2010
Automatic electrical controls for household and similar use. Part 2-7 Particular requirements for timers and time switches

BS EN 60799:1998
Electrical accessories. Cord sets and interconnection cord sets

BS EN 60947-1:2007+A2:2014
Low-voltage switchgear and controlgear. Part 1 General rules

BS EN 60947-2:2017
Low-voltage switchgear and controlgear. Part 2 Circuit-breakers

BS EN 60947-3:2009+A2:2015
Low-voltage switchgear and controlgear. Part 3 Switches, disconnectors, switch-disconnectors and fuse-combination units

BS EN 60947-3:2009+A2:2015
Low-voltage switchgear and controlgear. Part 3 Switches, disconnectors, switch-disconnectors and fuse-combination units

BS EN 60947-4-1:2010+A1:2012
Low-voltage switchgear and controlgear. Part 4-1 Contactors and motor-starters. Electromechanical contactors and motor-starters

BS EN 60947-4-2:2012
Low-voltage switchgear and controlgear. Part 4-2 Contactors and motor-starters. A.C. semiconductor motor controllers and starters

BS EN 60947-4-3:2014
Low-voltage switchgear and controlgear. Contactors and motor-starters. AC semiconductor controllers and contactors for non-motor loads

BS EN 60947-5-1:2017
Specification for low-voltage switchgear and controlgear. Part 5-1 Control/circuit devices and switching elements. Electromechanical control circuit devices

BS EN 60947-5-1:2017
Specification for low-voltage switchgear and controlgear. Part 5-1 Control/circuit devices and switching elements. Electromechanical control circuit devices

BS EN 60947-5-2:2007+A1:2012
Low-voltage switchgear and controlgear. Control circuit devices and switching elements. Proximity switches

BS EN 60947-5-3:2013
Low-voltage switchgear and controlgear. Control circuit devices and switching elements. Requirements for proximity devices with defined behaviour under fault conditions (PDDB)

BS EN 60947-5-4:2003
Specification for low-voltage switchgear and controlgear. Part 5-4 Control circuit devices and switching elements. Method of assessing the performance of low-energy contacts. Special tests

BS EN 60947-5-5:1998+A2:2017
Low-voltage switchgear and controlgear. Part 5-5: Control circuit devices and switching elements - Electrical emergency stop device with mechanical latching function

BS EN 60947-5-6:2001
Specification for low-voltage switchgear and controlgear. Control circuit devices and switching elements. DC interface for proximity sensors and switching amplifiers (NAMUR). DC interface for proximity sensors and switching amplifiers (NAMUR)

BS EN 60947-5-7:2003
Specification for low-voltage switchgear and controlgear. Control circuit devices and switching elements. Requirements for proximity devices with analogue output

BS EN 60947-5-8:2006
Low-voltage switchgear and controlgear. Control circuit devices and switching elements. Three-position enabling switches

BS EN 60947-5-9:2007
Low-voltage switchgear and controlgear. Control circuit devices and switching elements. Flow rate switches

BS EN 60947-6-1:2005+A1:2014
Low-voltage switchgear and controlgear. Multiple function equipment. Transfer switching equipment

BS EN 60947-6-2:2003
Specification for low-voltage switchgear and controlgear. Part 6-2 Multiple function equipment. Control and protective switching devices (or equipment) (CPS)

BS EN 60947-7-1:2009
Low-voltage switchgear and controlgear. Ancillary equipment. Terminal blocks for copper conductors

BS EN 60947-7-2:2009
Low-voltage switchgear and controlgear. Ancillary equipment. Protective conductor terminal blocks for copper conductors

BS EN 60947-7-3:2009
Low-voltage switchgear and controlgear. Ancillary equipment. Safety requirements for fuse terminal blocks

BS EN 60947-7-4:2013
Low-voltage switchgear and controlgear. Ancillary equipment. PCB terminal blocks for copper conductors

BS EN 60947-8:2003+A2:2012
Specification for low-voltage switchgear and controlgear. Part 8 Control units for built-in thermal protection (PTC) for rotating electrical machines

BS EN 60950-1:2006+A2:2013
Information technology equipment. Part 1 Safety. General requirements

BS EN 61058-2-1:2011
Switches for appliances. Part 2-1 Particular requirements for cord switches

BS EN 61184:2017
Bayonet lampholders

BS EN 61558-1:2005+A1:2009
Safety of power transformers, power supplies, reactors and similar products. Part 1 General requirements and tests

BS EN 61558-1:2005+A1:2009
Safety of power transformers, power supplies, reactors and similar products. Part 1 General requirements and tests

BS EN 61558-2-1:2007
Safety of power transformers, power supplies, reactors and similar products. Part 2-1 Particular requirements and tests for separating transformers and power supplies incorporating separating transformers for general applications

BS EN 61558-2-2:2007
Safety of power transformers, power supplies, reactors and similar products. Part 2-2 Particular requirements and tests for control transformers and power supplies incorporating control transformers

BS EN 61558-2-3:2010
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for ignition transformers for gas and oil burners

BS EN 61558-2-4:2009
Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V. Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers

BS EN 61558-2-5:2010
Safety of transformers, reactors, power supply units and combinations thereof. Part 2-5 Particular requirements and tests for transformer for shavers, power supply units for shavers and shaver supply units

BS EN 61558-2-5:2010
Safety of transformers, reactors, power supply units and combinations thereof. Part 2-5 Particular requirements and tests for transformer for shavers, power supply units for shavers and shaver supply units

BS EN 61558-2-6:2009
Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V. Part 2-6 Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers

BS EN 61558-2-8:2010
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for transformers and power supply units for bells and chimes

BS EN 61558-2-9:2011
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for transformers and power supply units for class III handlamps for tungsten filament lamps

BS EN 61558-2-10:2014
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for separating transformers with high insulation level and separating transformers with output voltages exceeding 1 000 V

BS EN 61558-2-12:2011
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for constant voltage transformers and power supply units for constant voltage

BS EN 61558-2-13:2009
Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V. Particular requirements and tests for auto transformers and power supply units incorporating auto transformers

BS EN 61558-2-14:2013
Safety of transformers, reactors, power supply units and combination thereof. Particular requirements and tests for variable transformers and power supply units incorporating variable transformers

BS EN 61558-2-15:2012
Safety of transformers, reactors, power supply units and combinations thereof. Part 2-15 Particular requirements and tests for isolating transformers for the supply of medical locations

BS EN 61558-2-16:2009+A1:2013
Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V. Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units

BS EN 61558-2-20:2011
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for small reactors

BS EN 61558-2-23:2010
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for transformers and power supply units for construction sites

BS EN 61558-2-23:2010
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for transformers and power supply units for construction sites

BS EN 61558-2-26:2013
Safety of transformers, reactors, power supply units and combinations thereof. Particular requirements and tests for transformers and power supply units for saving energy and other purposes

BS EN 62094-1:2003
Indicator light units for household and similar fixed-electrical installations. Part 1 General requirements

BS EN 62262:2002
Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)

BS EN 62368-1:2014+A11:2017
Audio/video, information and communication technology equipment. Safety requirements

BS EN 62626-1:2014
Low-voltage switchgear and controlgear enclosed equipment. Enclosed switch-disconnectors outside the scope of IEC 60947-3 to provide isolation during repair and maintenance work

BS EN 62680-1-1:2015
Universal Serial Bus interfaces for data and power. Universal Serial Bus interfaces. Common components. USB Battery Charging Specification, Revision 1.2 (TA 14)

BS EN 62680-1:2013
Universal serial bus interfaces for data and power. Universal serial bus specification, revision 2.0

Y8 Other Common Elecrical Items

Y80 EARTHING AND BONDING

1010 GENERAL:
- Use materials and installations methods in accordance with BS EN 62305, BS 7671, BS 7430, Electricity Safety, Quality and Continuity Regulations and local Distribution Network Operator requirements as appropriate.

2000 PRODUCTS/MATERIALS

2010A CONDUCTORS FOR LIGHTNING PROTECTION SYSTEMS - HORIZONTAL AIR TERMINATIONS:
- Use - Horizontal air termination or down conductor.
- Minimum dimension - BS EN IEC 62561-2.
- Form - Strip.
- Material - Copper, annealed.
- Coverings - None or PVC.
- Accessories - Ridge Saddle; conductor clips - non-metallic; glazing bar holdfast; slate holdfast; backplate holdfast; all accessories sized to suit conductors.

2010B CONDUCTORS FOR LIGHTNING PROTECTION SYSTEMS - SELF SUPPORTING AIR TERMINATIONS:
- Use - Air termination, vertical.
- Minimum dimension - BS EN IEC 62561-2.
- Form - Rod.
- Material - Copper, hard drawn.
- Coverings - None.
- Accessories - Terminal base; ridge saddle; rod brackets; rod to tape coupling.

2010C CONDUCTORS TO EARTHING SYSTEMS TO BS 7430:
- Use - Earthing conductor.
- Minimum dimension - BS 7430, current density 50A/mm^2.
- Form - Strip.
- Material - Copper, annealed.
- Coverings - None.
- Accessories - Conductor clips, metallic.

2020A LIGHTNING PROTECTION CONDUCTOR JOINTS:
- First Conductor
  - Form - strip; material - copper.
  - Dimensions - To BS EN IEC 62561-2.
- Second conductor
  - Form - rod; material - copper.
  - Dimensions - To BS EN IEC 62561-2.
- Solid joint - Brazed or welded, thermic.
- Disconnecting test joint
  - Square clamp, oblong clamp, plate clamp or screw-down clamp.

2020B EARTHING SYSTEMS CONDUCTOR JOINTS:
- First Conductor
  - Form - strip; material - copper.
  - Dimensions - For conductor current density 50A/mm^2 earthing systems.

- Second conductor
  - Form - rod; material - copper.
  - Dimensions - For conductor current density 50A/mm^2 earthing systems.
- Solid joint - Brazed or welded, thermic.
- Disconnecting test joint
  - Square clamp, oblong clamp, plate clamp or screw-down clamp.

2030A TAPE FIXING DEVICES:
- Standard - BS EN 62561-4 for lightning protection system conductor fasteners.
- Secure bare conductor tape to structure with fixing devices which avoid piercing tape and ensure 3mm (minimum) clearance of tape from structure, at 450mm maximum, centres.
- Material for lightning protection systems
  - Non-conducting.
- Material for system earthing
  - Bronze.

2040A ROD EARTH ELECTRODES FOR LIGHTNING PROTECTION SYSTEMS:
- Standard - BS EN IEC 62561-2 and BS 7671 (IET Wiring Regulations). Form - Roll threaded rod.
- Dimensions
  - Rod Diameter - 15 mm - nominal.
  - Rod Length - 2.4 m (2 x 1.2) minimum.
- Earth electrode couplings
  - Use silicon bronze alloy or aluminium bronze alloy, counter bored to completely enclose rod threads. Ensure rods meet in centres of coupling.
  - Use high strength driving cap in contact with driven rod and couplings of compatible material fully enclosing the rod threads.
- Interconnect electrodes using 25 x 3 mm bare copper tape.
- Earth electrodes in drawpits
  - Provide concrete cover, permanently labelled, for electrodes installed through cable drawpit bases.
- Material, minimum size as BS 7430 Table 4
  - Molecularly bonded copper clad steel rods to BS 7430 or BS EN 62305.
- Accessories
  - Rod to tape clamp or U-bolt clamp. Accessories sized to suit earth rod and connector.

2040B ROD EARTH ELECTRODES FOR SYSTEM EARTHING:
- Standard - BS 7430 and BS 7671 (IET Wiring Regulations).
- Form - rod with female thread each end.
- Dimensions
  - Rod Diameter - 15 mm - nominal.
  - Rod Length - 2.4 m (2 x 1.2) minimum.
- Earth electrode couplings
  - Use high strength driving cap in contact with driven rod and couplings of compatible material fully enclosing the rod threads.
- Interconnect electrodes using bare copper tape 25 mm x 6 mm.
- Earth electrodes in drawpits
  - Provide concrete cover, permanently labelled, for electrodes installed through cable drawpit bases.
- Main earth conductor connection
  - Connect main earth conductor to first electrode using heavy duty purpose made silicon aluminium bronze body conductor clamp and high tensile phosphor bronze bolt.
- Material, minimum size as BS 7430 Table 4 - Copper.
- Accessories
  - Rod to tape clamp. Sized to suit earth rod and connector.
- Ensure earth electrodes intended to minimise touch voltage, to exposed-conductive-parts and extraneous-conductive-parts, in the event of a broken protective earth and neutral (PEN) conductor in the public supply network, are designed with consideration of, as a minimum, the likely loads in the installation, the relevant network conditions, and the design guidance in IET Guidance Note 5: Protection

Against Electrical Shock.

2040C BUILDING OR STRUCTURAL ELEMENT EARTH ELECTRODES FOR LIGHTNING PROTECTION SYSTEMS:

- Standard - relevant parts of BS EN 62305 and BS 7671 (IET Wiring Regulations).
- Form - Building or structural element, as shown on the drawings.
- Interconnect electrodes using 25 mm x 3 mm bare copper tape.
- Ensure that materials and dimensions of earth electrodes are selected to
  - withstand corrosion such that the mechanical integrity of the structural element is not impaired, and the possible increase in earth electrode resistance is minimised.
  - have adequate mechanical strength
- Where an earth electrode consists of parts that must be connected together, ensure connections are made by welding, pressure connections, clamps or other suitable mechanical connectors.

2040D BUILDING OR STRUCTURAL ELEMENT EARTH ELECTRODES FOR SYSTEM EARTHING:

- Standard - BS 7430 and BS 7671 (IET Wiring Regulations).
- Form - Building or structural element, as shown on the drawings.
- Interconnect electrodes using bare copper tape 25 mm x 6 mm.
- Ensure that materials and dimensions of earth electrodes are selected to
  - withstand corrosion such that the mechanical integrity of the structural element is not impaired, and the possible increases in earth electrode resistance is minimised.
  - have adequate mechanical strength
- Where an earth electrode consists of parts that must be connected together, ensure connections are made by welding, pressure connectors, clamps or other suitable mechanical connectors.
- Ensure earth electrodes intended to minimise touch voltage, to exposed-conductive-parts and extraneous-conductive-parts, in the event of a broken protective earth and neutral (PEN) conductor in the public supply network, are designed with a consideration of, as a minimum, the likely loads in the installation, the relevant network conditions, and the design guidance in IET Guidance Note 5: Protection Against Electric Shock.

2040E FOUNDATION EARTH ELECTRODES:

- Standard
  - BS 7671 (IET Wiring Regulations) for all foundation electrodes.
  - Relevant parts of BS EN 62305, where a lightning protection system is present.
- Ensure that materials and dimensions of foundation earth electrodes are selected to:
  - withstand corrosion such that the mechanical integrity of the structure of the foundation is not impaired, and the possible increase in earth electrode resistance is minimised.
  - adequate mechanical strength
- Ensure foundation earth electrodes intended to minimise touch voltage, to exposed-conductive-parts and extraneous-conductive-parts, in the event of a broken protective earth and neutral (PEN) conductor in the public supply network, are designed with consideration of, as a minimum, the likely loads in the installation, the relevant network conditions, and the design guidance in IET Guidance Note 5: Protection Against Electric Shock.

2050 EARTH ELECTRODES FOR CATHODICALLY PROTECTED STRUCTURES:

- Provide earth electrode for cathodically protected structures to BS EN 13636 as indicated.

2060A EARTH ELECTRODE CLAMPS:

- Connect tape to electrode head using heavy duty purpose made silicon aluminium bronze body connector clamps or leaded gunmetal body connector clamps, and high tensile phosphor bronze bolts to BS EN 12163.

2070A EARTH ELECTRODE INSPECTION FACILITIES:

- Standard - BS EN 62561-5 for lightning protection systems for earth electrode inspection housings and earth electrode seals.
- Provide enclosure for each connection between earth conductor and associated earth electrode system. Install so that top is flush with finished ground or floor level. Ensure enclosure provides adequate access for testing purposes. Provide pit details for builders work.
- Labelling - Wording, Earth.

2090A MAIN EQUIPOTENTIAL BONDS:

- Provide main equipotential bonds in accordance with BS 7671.
- Material - Insulated cable, single core to BS 6004.
- Use no joints in main equipotential bonds.

2100A SUPPLEMENTARY EQUIPOTENTIAL BONDS:

- Provide supplementary equipotential bonds to BS 7430, BS 7671 and BS EN 50310. Do not use joints in supplementing bonds.
- Material - Insulated cable, single core to BS 6004.

2110A CIRCUIT PROTECTIVE CONDUCTORS:

- Material
  - Insulated cable, single core to BS 6004 as indicated; metallic screwed conduits (excluding flexible); metallic trunking with tinned copper links; armouring and/or metallic sheathing of armoured cables or integral conductor of multi-core cable.
- Size
  - Provide protective conductors sized in accordance with BS 7671 (IET Regulations) 543.1.4 and Table 54.7.

2120 EARTHING CLAMPS:

- Use clamps complying with BS 951, for bonding pipes and earthing of conductors. For bonding of lead sheathed cables use soldered or spring clamps.

2130A EARTH BUSBARS:

- Material
  - Manufacture earth busbars from hard drawn, tinned, high conductivity copper bar.
- Substation Earth busbar
  - 75 x 13mm cross section 600mm minimum length.
- Main Earth Terminal busbar
  - 25 x 6 mm minimum for incoming live conductor not exceeding 50mm and 50 x 6 mm minimum for incoming live conductor over $50mm^2$.

2140 TEST LINKS:

- Provide two test links, in connections between main earth conductors and earth busbar. Fabricate each from two additional sections of earth busbar. Mount one section on stand-off insulators matching earth busbar; use remaining section as removable test link. Secure 12mm high tensile brass studs to fixed sections of busbar and drill corresponding clearance holes in test links and provide brass washers, nuts and locking devices to secure frame/neutral earthing and test links.

2150 LUGS/TAGS:

- Provide lugs or tags to enable connection of bonding conductors to equipment earth terminals.

2160 PROTECTIVE CABLE TERMINATIONS:
- For bolted connections use crimp type lugs compressed by automatic tool to achieve correct pressure and crimp depth.

2170 PROTECTIVE CONDUCTOR WARNING NOTICES/LABELS:
- Provide a permanent label durably marked in letters 4.75mm minimum height "SAFETY ELECTRICAL CONNECTION - DO NOT REMOVE", in visible position, at each bonding conductor connection to extraneous conductive parts.

2180 MAIN EARTH CONDUCTOR - WARNING TAPES:
- Provide green/yellow PVC tapes labelled "EARTHING CONDUCTOR" over complete external lengths of main earth conductors at 300mm depth below finished ground.

2190 EARTH BAR LABEL:
- Label earth bar "SAFETY ELECTRICAL CONNECTION - DO NOT REMOVE" with wall-mounted laminated plastic tablet engraved in 10mm high red letters on white ground.

3000 WORKMANSHIP

3010 LOW NOISE EARTH DISTRIBUTION:
- Install low noise earth distribution in double insulated cables from earth electrodes to equipment points. Mount all busbars with insulators and separate from other earthing systems.

3020 DISSIMILAR METALS:
- Ensure, where dissimilar metals are used for system, that purpose made jointing materials are used such that corrosion and deterioration of the electrical connection are not caused.
- Ensure bonding connections to other metal parts of building are electrolytically compatible with those metal parts. Use the following guidance when earthing and bonding connections comprise dissimilar materials:
  - BS 7430 Table 9.
  - BS EN 62368-1 Annex N.

3030A COPPER TAPE JOINTS:
- Provide waterproof protection at joints subject to moisture.
- Joint copper tapes by brazing, using zinc-free brazing metal with melting point at least 600°C or thermic welding.

3030B ALUMINIUM TAPE JOINTS:
- Provide waterproof protection at joints subject to moisture.
- Joint aluminium tapes by welding to BS EN 1011-4.

3040 STRANDED CONDUCTOR JOINTS:
- Provide waterproof protection at joints subject to moisture.
- Joint copper stranded conductors with compression joints to BS EN 61238.

3050A PROTECTIVE CABLE TERMINATIONS:
- For bolted connections use crimp type lugs compressed by automatic tool to achieve correct pressure and crimp depth.
- Make connections between tape and equipment using high tensile grade brass bolts with brass nuts,

washers and locking devices. Use phosphor bronze bolts, nuts and washers where connections are liable to corrosion.

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3060A EARTH ELECTRODES:

- Location
  - Locate electrodes not less than 2m distant from building/structure protected, and away from telecommunication and pilot cables and metallic fences.
- Driving
  - Drive rods vertically into ground with purpose designed electric hammer. (Where impenetrable strata encountered at shallow depth, drive at 30° to horizontal).
- Depth of rod
  - 2.4m minimum below finished ground surface.
- Depth of Electrode heads
  - Locate electrode heads just below ground level.
- Spacing
  - Where electrodes are installed in a group ensure minimum distance between electrodes is twice depth of rods. Where rods for clean earth are installed ensure distance from any other system rods is six times depth of clean rods.
- Tape Depth
  - Install interconnecting or electrode tape 750mm below finished ground level, rising vertically at each electrode.
- Connect groups of electrodes to main earth conductor via bolted link in inspection pit as BS 7430 for test purposes.

BS APPENDIX

BS 951:2009
Electrical earthing. Clamps for earthing and bonding. Specification

BS 2571:1990
Specification for general-purpose flexible PVC compounds for moulding and extrusion

BS 6004:2012
Electric cables. PVC insulated and PVC sheathed cables for voltages up to and including 300/500 V, for electric power and lighting

BS 7211:2012
Electric cables. Thermosetting insulated and thermoplastic sheathed cables for voltages up to and including 450/750 V, for electric power and lighting and having low emission of smoke and corrosive gases when affected by fire

BS 7430:2011+A1:2015
Code of practice for protective earthing of electrical installations

BS 7454:1991
Method for calculation of thermally permissible short-circuit currents, taking into account non-adiabatic heating effects

BS 7671:2018

Requirements for electrical installations. IET Wiring Regulations

BS EN 1011-4:2000
Welding. Recommendations for welding of metallic materials. Part 4 Arc welding of aluminium and aluminium alloys

BS EN 1561:2011
Founding. Grey cast irons

BS EN 12163:2016
Copper and copper alloys. Rod for general purposes

BS EN 13636:2004
Cathodic protection of buried metallic tanks and related piping

BS EN 50310:2016
Telecommunications bonding networks for buildings and other structures

BS EN 50525-1:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). General requirements

BS EN 50525-2-41:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables for general applications. Single core cables with crosslinked silicone rubber insulation

BS EN 50525-2-42:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables for general applications. Single core non-sheathed cables with crosslinked EVA insulation

BS EN 50525-3-41:2011
Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V (U0/U). Cables with special fire performance. Single core non-sheathed cables with halogen-free crosslinked insulation, and low emission of smoke

BS EN 61238-1:2003
Compression and mechanical connectors for power cables for rated voltages up to 36 kV (Um = 42 kV). Part 1 Test methods and requirements

BS EN 62305-1:2011
Protection against lightning. Part 1 General principles

BS EN 62305-2:2012
Protection against lightning. Part 2 Risk management

BS EN 62305-3:2011
Protection against lightning. Part 3 Physical damage to structures and life hazard

BS EN 62305-4:2011
Protection against lightning. Part 4 Electrical and electronic systems within structures

BS EN 62368-1:2014+A11:2017
Audio/video, information and communication technology equipment. Safety requirements

BS EN 62561-1:2017
Lightning Protection System Components (LPSC). Part 1 Requirements for connection components

BS EN 62561-4:2017
Lightning protection system components (LPSC). Requirements for conductor fasteners

BS EN 62561-5:2017
Lightning protection system components (LPSC). Requirements for earth electrode inspection housings and earth electrode seals

BS EN ISO 1461:2009
Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods

Y81 TESTING AND COMMISSIONING OF ELECTRICAL SERVICES

1010 INSPECTION AND TEST PROCEDURE:

- Comply with
  - BS 7671 (IET Wiring Regulations) for requirements for initial and/or periodic verification of low voltage electrical installations in general
  - Relevant parts of BS EN 61557 and IET Guidance Note 3: Inspection and Testing for methods and measuring equipment, monitoring and methods
  - BS EN 60079-17 for appropriate safety precautions when undertaking inspection and testing in potentially explosive atmospheres
- Adopt progressive testing where necessary

1020 SUPPLY CHARACTERISTICS:

- Obtain information called for in BS 7671 about supply characteristics from Supplier, other than where to be measured as part of testing procedure.

1030 DESIGN INFORMATION:

- Obtain all design assumptions, calculations and any other information to enable compliance with BS 7671 to be verified.

2000 TESTING

2010A INCORPORATED EQUIPMENT CHARACTERISTICS:

- Obtain and use information from manufacturers of equipment provided.
- Use information provided, for equipment supplied by others and incorporated into installation.

2020A PROSPECTIVE FAULT CURRENT:

- Determine values of prospective fault current I_{pf} by measurement, unless other means are indicated as described in Appendix 14 of BS 7671. Determine I_{pf} at all necessary points within installation to confirm correct equipment selections.
- Obtain from supply undertaker written confirmation of maximum and minimum values of I_{pf} at origin of installation. Adjust subsequent measured values of I_{pf} accordingly.
- Where alternative supply arrangements are available select the arrangement which gives rise to highest I_{pf}.

2030A INITIAL VERIFICATION:

- Carry out detailed inspection to verify the requirements of BS 7671, Section 643 in the order given in Section 643.

2040A TEST EQUIPMENT AND CONSUMABLES:

- Provide test equipment and consumables to complete tests satisfactorily, and to retest any failed installations following corrective measures.
- Standards
  - Test equipment and accessories to BS EN 61557, relevant parts of BS EN 61010, and Health and Safety Executive Guidance Note GS38 Electrical test equipment for use of low voltage electrical systems.
  - Test equipment quality assurance requirements to BS EN ISO 10012.

2050 TESTING

• Carry out in the same order as published the tests required by BS 7671, Section 643 for New Installation or Altered or Added Installation as appropriate.

2070 PROTECTION BY AUTOMATIC DISCONNECTION OF SUPPLY:

• Using a test current of between 20 A and 25 A measure and record external earth fault loop impedance Z_e.

• If alternative supply arrangements are available, determine the lowest and highest values of Z_e.

• Verify the highest value of earth fault loop impedance Z_{db} for each distribution board.

• If alternative supply arrangements are available, verify the earth fault loop impedance Z_{db} for each distribution board when using the supply arrangement with the highest impedance.

• Measure the highest value of earth fault loop impedance Z_s for each circuit, and verify that each circuit meets the requirements of Chapter 41 of BS 7671, including the effectiveness of any supplementary protective equipotential bonding where necessary.

• If alternative supply arrangements are available, verify each circuit's earth fault loop impedance Z_s when using supply arrangement with highest impedance.

• Where residual current devices are used for automatic disconnection of supply, verify their operation using test equipment meeting BS EN 61557-6, taking into account the operating characteristic of the device in accordance with Table 3A in Appendix 3 to BS 7671.

• For IT systems, verify compliance with Regulation 411.6 of BS 7671 using methods identified in Regulation 643.7.1 c).

2080 SETTINGS AND ADJUSTMENTS:

Confirm settings of protection devices with the designer and make adjust protection device settings.

• Confirm characteristics and settings of protective devices are within maximum and minimum specified tripping times. Check correct operation of devices. Confirm interlocks and sequences operate safely and as indicated.

2090 STANDBY GENERATORS:

• Perform works tests on standby generators and provide test certificates. Comply with BS 5000-3 and BS 5000-11 or BS EN 60034-3 as appropriate.

2100A HV AND LV SWITCHGEAR:

• Perform works tests on HV and LV switchgear in accordance with BS EN 62271-200 and relevant parts of BS EN 61439, as appropriate, and provide test certificates.

2110A HV POWER TRANSFORMERS:

• Perform works tests on HV power transformers in accordance with BS EN 60076-3, BS EN 60076-4 and BS EN 60076-5. Provide test certificates.

• Perform all routine tests.

• Perform energy efficiency test.

2120A FIRE DETECTION AND ALARM INSTALLATIONS:

• Carry out site testing and inspection and provide test certificates for fire detection and alarm systems in accordance with relevant parts of BS 5839.

2120B LIGHTNING PROTECTION INSTALLATIONS:

• Carry out site testing and inspection and provide test certificates for lightning protection installations in accordance with BS EN 62305.

2120C FIRE PROTECTION OF ELECTRONIC DATA PROCESSING INSTALLATIONS:
- Carry out site testing and inspection and provide test certificates for fire protection of electronic data processing installations in accordance with BS 6266.

2120E EMERGENCY LIGHTING INSTALLATIONS:
- Carry out site testing and inspection and provide test certificates for emergency lighting installations in accordance with BS 5266-1, BS EN 50171, BS EN 50172, and BS EN 13032-1 as appropriate.

2130 CALIBRATION:
- Provide current certificates of calibration for all instruments used during test procedures. Record particular instrument identity on record sheets.
- Ensure that the method of calibration meets the quality assurance requirements of BS EN ISO 10012 and that all reference sources are traceable to United Kingdom Accreditation Services (UKAS) accredited standards.

2140 CERTIFICATION AND REPORTING:
- Complete and hand over to the Client a Completion and Inspection Certificate to BS 7671 Section 644 and Appendix 6 for New Installation or Additions or Alterations to an Existing Installation as appropriate.
- Append any risk assessments and other documentation required by BS 7671 to the certification.
- Append inspection and test results to the certificates.

2150 INSTALLATION CERTIFICATES:
- Provide installation certificates for electrical installations in accordance with BS 7671 (IET Wiring Regulations) Section 644 and Appendix 6.
- Record details of departures from BS 7671 (IET Wiring Regulations) on certificate.
- Provide copies of calculations justifying departure from BS 7671 (IET Wiring Regulations) and attach to certificates.
- Append any risk assessments and other documentation required by BS 7671 to the certificates.
- Inspection and test results to the certificates

2160 RECORDS:
- Record all results and instrument readings on approved Record Sheets and hand over to the client two copies for each inspection and test.
- Hand over copies of complete Record Sheets to
  - Client.
- Provide copies of Record Sheets
  - 2.
- Append results of testing to BS 7671 (IET Wiring Regulations) to the certification provided in accordance with Section 644

3000 WORKMANSHIP

3010 EXTRANEOUS-CONDUCTIVE-PARTS AND PROTECTIVE BONDING:
- Verify that all extraneous-conductive-parts of the installation are adequately connected to the main earth terminal in accordance with BS 7671 (IET Wiring Regulations).
- Verify that all extraneous-conductive-parts of a location are effectively connected by protective bonding. Unless protection against electric shock requires a lower value, verify that the impedance of main

protective bonding does not exceed 0.1 Ohms.
• Where additional protection is provided by supplementary protective bonding, verify that the resistance is sufficiently low to provide the required additional protection requirements of Chapter 41 of BS 7671, between simultaneously-accessible extraneous-conductive-parts and/or exposed-conductive-parts.
• Confirm the classification of conductive parts which are not verified as either exposed-conductive-parts or extraneous-conductive-parts of the location, as defined in BS 7671 (IET Wiring Regulations). Demonstrate that their impedance to the earthing terminal of the location is sufficiently high, in accordance with Section 13.5 of IET Guidance Note 5: Protection Against Electrical Shock, using appropriate values of human body resistance R_b and maximum current through the human body I_b for the installation conditions and external influences.

3030A HIGH VOLTAGE TESTS:
• Conduct high voltage tests for equipment indicated. Comply with BS 923-1, BS EN 61180 and BS EN 60060-2. Comply with BS EN 61180.

3040A LV BURIED CABLES:
• Test continuity and insulation of buried cables immediately after back-filling. Test continuity and insulation of buried cables prior to handover.

3040B HV AND LV BURIED CABLES:
• Test continuity and insulation of buried cables immediately after back-filling. Test continuity and insulation of buried cables prior to handover. Perform HV tests on buried HV cables prior to handover.

BS APPENDIX

BS 923-1:1990
Guide on high-voltage testing techniques. Part 1 General

BS 5000-3:2006
Rotating electrical machines of particular types or for particular applications. Part 3 Generators to be driven by reciprocating internal combustion engines. Requirements for resistance to vibration

BS 5000-11:1973
Specification for rotating electrical machines of particular types or for particular applications. Part 11 Small-power electric motors and generators

BS 5266-1:2016
Emergency lighting. Part 1: Code of practice for the emergency lighting of premises

BS 5839-1:2017
Fire detection and fire alarm systems for buildings. Part 1 Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises

BS 5839-3:1988
Fire detection and alarm systems for buildings. Part 3 Specification for automatic release mechanisms for certain fire protection equipment

BS 5839-6:2013
Fire detection and fire alarm systems for buildings. Part 6 Code of practice for the design, installation, commissioning and maintenance of fire detection and fire alarm systems in domestic premises

BS 5839-8:2013
Fire detection and fire alarm systems for buildings. Part 8 Code of practice for the design, installation, commissioning and maintenance of voice alarm systems

BS 5839-9:2011
Fire detection and fire alarm systems for buildings. Part 9 Code of practice for the design, installation, commissioning and maintenance of emergency voice communication systems

BS 6266:2011
Code of practice for fire protection for electronic equipment installations

BS 7671:2018
Requirements for electrical installations. IET Wiring Regulations

BS EN 13032-1:2004+A1:2012
Light and lighting. Measurement and presentation of photometric data of lamps and luminaires. Part 1 Measurement and file format

BS EN 50171:2001
Central power supply systems

BS EN 50172:2004, BS 5266-8:2004
Emergency escape lighting systems

BS EN 60034-3:2008
Rotating electrical machines. Part 3 Specific requirements for synchronous generators driven by steam turbines or combustion gas turbines

BS EN 60060-2:1995
High-voltage test techniques. Part 2 Measuring systems

BS EN 60076-3:2013+A1:2018
Power transformers. Part 3 Insulation levels, dielectric tests and external clearances in air

BS EN 60076-4:2002
Power transformers. Part 4 Guide to the lightning impulse and switching impulse testing. Power transformers and reactors

BS EN 60076-5:2006
Power transformers. Part 5 Ability to withstand short circuit

BS EN 60079-17:2014
Explosive atmospheres. Part 17 Electrical installations inspection and maintenance

BS EN 61010-1:2010
Safety requirements for electrical equipment for measurement, control and laboratory use. Part 1 General requirements

BS EN 61010-2-032:2012
Safety requirements for electrical equipment for measurement, control and laboratory use. Particular requirements for hand-held and hand-manipulated current sensors for electrical test and measurement

BS EN 61010-2-033:2012
Safety requirements for electrical equipment for measurement, control and laboratory use. Particular requirements for hand-held multimeters and other meters, for domestic and professional use, capable of measuring mains voltage

BS EN 61010-031:2015
Safety requirements for electrical equipment for measurement, control and laboratory use. Safety requirements for hand-held probe assemblies for electrical measurement and test

BS EN 61180-1:1995
High-voltage test techniques for low-voltage equipment. Part 1 Definitions, test and procedure requirements

BS EN 61180-2:1995
High-voltage test techniques for low-voltage equipment. Part 2 Test equipment

BS EN 61439-1:2011
Low-voltage switchgear and controlgear assemblies. Part 1 General rules

BS EN 61439-2:2011
Low-voltage switchgear and controlgear assemblies. Power switchgear and controlgear assemblies

BS EN 61439-3:2012
Low-voltage switchgear and controlgear assemblies. Distribution boards intended to be operated by ordinary persons (DBO)

BS EN 61439-4:2013
Low-voltage switchgear and controlgear assemblies. Particular requirements for assemblies for construction sites (ACS)

BS EN 61439-5:2015
Low-voltage switchgear and controlgear assemblies. Assemblies for power distribution in public networks

BS EN 61439-6:2012
Low-voltage switchgear and controlgear assemblies. Busbar trunking systems (busways)

BS EN 61557-1:2007
Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. Equipment for testing, measuring or monitoring of protective measures. Part 1 General requirements

BS EN 61557-2:2007
Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. Equipment for testing, measuring or monitoring of protective measures. Insulation resistance

BS EN 61557-3:2007
Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. Equipment for testing, measuring or monitoring of protective measures. Loop impedance

BS EN 61557-4:2007
Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. Equipment for testing, measuring or monitoring of protective measures. Resistance of earth connection and equipotential bonding

BS EN 61557-5:2007
Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. Equipment for testing, measuring or monitoring of protective measures. Resistance to earth

BS EN 61557-6:2007
Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 Vd.c. Equipment for testing, measuring or monitoring of protective measures. Effectiveness of residual current devices (RCD) in TT, TN and IT systems

BS EN 61557-7:2007
Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. Equipment for testing, measuring or monitoring of protective measures. Phase sequence

BS EN 61557-8:2015
Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. Equipment for testing, measuring or monitoring of protective measures. Insulation monitoring devices for IT systems

BS EN 61557-9:2015
Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. Equipment for testing, measuring or monitoring of protective measures. Equipment for insulation fault location on IT systems

BS EN 61557-10:2013
Electrical safety in low voltage distribution systems up to 1000 V a.c and 1500 V d.c. Equipment for testing, measuring or monitoring of protective measures. Combined measuring for testing, measuring or monitoring of protective measures

BS EN 61557-11:2009
Electrical safety in low voltage systems up to 1000 V a.c. and 1500 V d.c. Equipment for testing, measuring or monitoring of protective measures. Effectiveness of residual current monitors (RCMs) type A and type B in TT, TN and IT systems

BS EN 61557-13:2011
Electrical safety in low voltage systems up to 1000 V a.c. and 1500 V d.c. Equipment for testing, measuring or monitoring of protective measures. Hand-held and hand-manipulated current clamps and sensors for measurement of leakage currents in electrical distribution systems

BS EN 61557-14:2013
Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. Equipment for testing, measuring or monitoring of protective measures. Equipment for testing the safety of electrical

equipment of machinery

BS EN 61557-15:2014
Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. Equipment for testing, measuring or monitoring of protective measures. Functional safety requirements for insulation monitoring devices in IT systems and equipment for insulation fault location in IT systems

BS EN 61557-16:2015
Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. Equipment for testing, measuring and monitoring of protective measures. Equipment for testing the effectiveness of the protective measures of electrical equipment and/or medical electrical equipment

BS EN 62271-200:2012
High-voltage switchgear and controlgear. Part 200 AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV

BS EN 62305-1:2011
Protection against lightning. Part 1 General principles

BS EN 62305-2:2012
Protection against lightning. Part 2 Risk management

BS EN 62305-3:2011
Protection against lightning. Part 3 Physical damage to structures and life hazard

BS EN 62305-4:2011
Protection against lightning. Part 4 Electrical and electronic systems within structures

BS EN ISO 10012:2003
Measurement management systems. Requirements for measurement processes and measuring equipment

Y82 IDENTIFICATION - ELECTRICAL

2000 PRODUCTS/MATERIALS

2010A LABELS AND NOTICES:

- Apply identification labels and notices in accordance with BS 7671 (IET Wiring Regulations), Section 514 to all electrical cables plant and equipment including components of mechanical systems.
- BS 7671 labels and notices
- Identification of protective devices.
  - Diagrams, charts or tables to comply with Clauses 514.9 and 560.7.9, 560.7.10 and 560.7.11
  - Warning notices, voltages in excess of 230 volts to earth
  - Periodic inspection and test notices.
  - Residual current device quarterly test notices.
  - Earth electrode safety electrical connection label.
  - Bonding conductor connector point to extraneous conductive parts label.
  - Earth free local equipotential bonding areas warning notice.
  - Electrical separation areas warning notice.
  - Outdoor equipment socket outlet notice.
  - Operating instructions to comply with Clause 560.7.12.
  - Warning notice, non-standard wiring colours.
  - Warning notices, alternative sources of supply.
  -

2020A MATERIALS:

- Use materials for labels and notices with a predicted life equal to or greater than the design life of the electrical cables, plant, equipment or installation to which it refers.
- External
  - Signwritten, or stencil in paint compatible with surface.
  - Colour - Background, plant standard finish. Lettering, white.
- Internal
  - Engraved thermosetting plastic laminate.
  - Colour - Background, white or red. Lettering, red or white.

2030A FIXING - INTERNAL:

- Fix labels and notices using materials compatible with label or notice and surface to which it is fixed by screws into tapped hole or bolted complete with washer nut and locking device.

2040# ARRANGEMENT:

2040A ARRANGEMENT:

- Obtain approval prior to manufacture, with regard to style, colour, lettering, size and position of all labels and notices.
  - Provide sample showing style, colour, lettering and size, for approval.

2050A LETTERING AND SIZE OF LABELS AND NOTICES:

- Ensure that all lettering and symbols comply with the requirements laid out in BS ISO 3864-1 for height of lettering where not otherwise indicated. Ensure labels and notices of adequate size for the lettering required, and allow a minimum margin around all lettering of one line space vertically and two letter spacing horizontally.
- Font - Helvetica Medium.
- Size - 5mm minimum high letters.

2060A CONDUCTOR ARRANGEMENT:

- Arrange circuit polarity so that phases read in phase rotation order followed by the neutral, if any, from top to bottom in horizontal conductor layouts and left to right in vertical conductor layouts. Ensure flat horizontal arrays have leading phase to the left and neutral to the right from left to right when viewed from supply point. Arrange phase or live pole of two wire apparatus at top or left hand and neutral and earth both at bottom or right hand side. In all cases, ensure conductor arrangements defined are when viewed from front face of all equipment and terminating facilities. Apply identification markers in accordance with BS 7671 (IET Wiring Regulations), section 514 to all conductor termination points.

2070 SAFETY SIGNS:

- Label all electrical plant and equipment in accordance with relevant parts of BS ISO 3864 and provide safety signs complying with BS EN ISO 7010.
- Identify each substation and main switchroom.
- For any fire extinguishing system provide signs in accordance with BS EN ISO 7010.
- Give details of:
  - Name of the substation or switchroom.
  - The presence of medium and low voltages.
  - Administrative instruction for access.
  - Location and method of contacting controlling authority.
  - Action to be taken in an emergency.
- Position safety signs in accordance with BS 5499-10.

2080A PLANT AND EQUIPMENT LABELS:

- Fit labels on all items of plant, equipment, switches, etc., include the following information: service controlled, circuit reference, voltage, type of supply and phase etc., circuit protection type and rating.

2085 GRAPHICAL SYMBOLS FOR USE ON EQUIPMENT IN ACCORDANCE WITH BS EN 80416:

- Graphical symbols for use on equipment to be created and applied in accordance with BS EN 80416-1, BS EN 80416-2, BS EN 80416-3.

2090 MAINTENANCE NOTICES:

- Fix notices giving warning of, and instructions on, any special maintenance procedures to plant and equipment.

2100 COLOUR CORRECTED LIGHT FITTINGS:

- Fix a warning or identification disc to light fittings containing colour corrected fluorescent tubes or other colour corrected light sources to ensure that maintenance staff install the correct lamps.

2110A MOTORS AND STARTERS LABELS:

- Fit identification labels to all motors, starters and starter panels. Ensure positive identification of respective motors and starters. Provide motors with non-corrodible labels attached adjacent to each bearing giving details of the lubricant to be used. Mark direction of normal rotation on motor casing. Provide labels to identify motor equipment fitted with surge suppressors and thermistors stating that insulation test voltages must not be applied to thermistors and thermistor control units. Ensure labelling is compatible with schematic and wiring diagrams, and complies with BS EN 60034-8.

2120A LABELLED ACCESSORY PLATES - ENGRAVED:

- Label accessory plates, including lighting switches, socket outlets and connection units to indicate their use. Label by engraving, lettering 6mm high colour red.

2120B LABELLED FIRE ALARM ACCESSORIES:

- Label fire alarm accessory plates to indicate address. Label using permanent stick on labels, lettering

6mm high colour black.

2120C LABELLED NURSE/PATIENT CALL SYSTEM ACCESSORY PLATES:
- Label nurse/patient call system accessory plates, including bedhead units and call system units.
- Label by engraving, lettering 6mm high colour red.

2130 SWITCHGEAR:
- Fit labels on switchgear to relevant parts of BS EN 61439 to indicate duty of unit, its voltage, phase and current rating, protective device rating size of conductor involved, and all other necessary details.
- Use an agreed serial coding system, provide at the switch a key to the coding system.

2140 DISTRIBUTION BOARDS:
- On each distribution board identify every outgoing way with a renewable circuit chart in a transparent plastic envelope permanently fitted inside distribution board cover. Clearly indicate in typed script, circuit identification number, cable size, fuse or circuit breaker rating and a description of item supplied and area supplied by circuit.

2150A SCHEMATIC DIAGRAMS:
- Provide a purpose made schematic diagram permanently fixed showing the connections of the equipment and plant.
- Locations and materials as indicated in contract preliminaries.

2160 SPECIAL PURPOSE EARTHING:
- Fit labels to special purpose earthing conductors and connection points, describing their purposes and any instructions necessary for their operation and maintenance.
- Earthing and bonding networks for buildings with telecommunications, information technology and control system installations in accordance with BS EN 50310 and BS 7671.
- Telecommunications functional earths as BS 6701.

2170A INDICATOR LAMPS AND PUSH BUTTONS FOR POWER SYSTEMS:
- Use indicator lamp and push button colours in accordance with BS EN 60073.

Indicator lamp
  - Red, danger or alarm; yellow, caution; green, safety.
- Push buttons
  - Red, emergency action; red, stop or off; yellow, intervention; green, start or on.
- Illuminated push buttons - Type a.

2180A CONDUIT AND TRUNKING COLOUR CODING:
- In areas of mechanical plant or voids accommodating mechanical services, or where otherwise indicated, identify electrical conduits and ducts in accordance with BS 1710. Apply colour orange to BS 4800 by painting on service as a band over 150mm or applying an adhesive tape type wrap around services over a length of 150mm.
- Place identification colours at bulkheads, wall penetrations and any other place where identification is necessary.

2190A CABLE IDENTIFICATION:
- Provide all cables, other than final sub-circuit wiring enclosed in conduits or trunking, with labels fixed at each end of cable either side of wall and floor penetrations at approximately 12m intervals at convenient inspection points by means of non-releasable plastic straps, minimum width 4mm.
- Ensure labels show the reference number of cable.

•

2200A TERMINAL MARKING AND CONDUCTOR IDENTIFICATION:
• Provide for switchgear and control gear elements whose terminals are marked in accordance with BS 5472 (EN 50005) and BS 6272 (EN 50042). Use a unique reference to identify each element in the switchgear or control gear. Mark on or adjacent to each element its reference. Identify each terminal for connection to external wiring or cabling using a reference system complying with BS EN 60445 based on the element reference and the appropriate element terminal reference.
  • Adjacent to terminals.
• Use lettered or numbered ferrules or sleeves to BS 3858 to mark each auxiliary conductor or control cable core with the identity of the terminal to which it is connected and the reference of plant or equipment to which it is connected and the identity of the terminal at the remote end. Ensure that main circuit conductors are identified in accordance with BS 7671 (IET Wiring Regulations) Section 514. Ensure that all identification of terminals and conductors is recorded and included on record drawings and in operation and maintenance documentation.

2210A UNDERGROUND CABLE IDENTIFICATION:
• Identify external underground cable routes by means of approved markers along their length at distances not exceeding 50m and where a change of direction occurs on such routes. Provide cables markers with a brass plate or impress concrete to clearly indicate the reference of group of cables or reference number of cable and operating voltage of cable. Provide key to any reference system used at switchgear. Mark and protect direct buried cables with plastic tape yellow printed black "DANGER ELECTRIC CABLES" elsewhere.

2220A CABLE CONDUCTOR COLOUR CODING:
• Identify cable conductors in accordance with BS 7671 (IET Wiring Regulations) Section 514 and Appendix 7, note that a lighting sub-circuit switch wire is a phase conductor in a single-phase circuit.

2230 CABLE JOINTING AND TERMINATION:
• Connect all cables in the installation so that the correct sequence of phase rotation is maintained throughout. Where straight through joints are approved joint medium voltage conductors as they lie, ensuring their complete length is phased out on completion. Ensure connections at terminations of MV cables are made in the correct phase rotation and ensure cable conductor termination marking if any, complies with this phase sequence. Where straight through joints are approved on low voltage cables, whether power cables or control or auxiliary cables, joint conductors strictly in accordance with their colour or numeric coding. Where such joints are approved on mineral insulated or other non-coded conductor cables, identify each core at the joint and make the joint core to core.

2240A CABLE SHEATH IDENTIFICATION - INTERNAL:
• Use to identify coloured cables sheaths for various services as follows.
  • Fire alarm, red;
  • Clock circuits, brown;
  • Telecommunications, grey;
  • Data as system suppliers requirements;
  • Control, black;
  • LV, black;
  • LV mineral insulated, orange;
  • MV red.
• Code cables for various services using alpha numeric symbols as follows.
  • Code letters preceding cable reference.
  • Fire alarm, FA.
  • Clock, CL.
  • Telecommunications, T.
  • Data, D.
  • Control, C.

- Low voltage, LV.
- Extra low voltage, ELV.
- LV Essential circuits EM.
- Medium voltage, HV.

2250A CABLE SHEATH IDENTIFICATION - EXTERNAL:
- Identify cable sheaths for various services in accordance with NJUG Guidelines on the Positioning and Colour Coding of Utilities' Apparatus, as follows.
  - MV Red; LV Black; telecommunications and data, Grey.

2250B CABLE SHEATH IDENTIFICATION - EXTERNAL, SCOTLAND:
- Identify cable sheaths for various services in accordance with NJUG Guidelines on the Positioning and Colour Coding of Utilities' Apparatus, as follows.
  - MV Red; LV Purple; telecommunications and data, Grey.

2260A ADDITIONAL SAFETY SIGNS:
- Provide at locations shown or as appropriate safety signs to BS ISO 3864-1.
- Application
  - For main switch and electrical plant room access doors, BS EN ISO 7010 complete with supplementary signs as shown with "Authorised persons only".
  - For use with permit to work systems, BS EN ISO 7010 complete with supplementary signs as shown "Do not operate. Work in progress".
  - For use at each emergency stop, BS EN ISO 7010 complete with supplementary signs as shown "Emergency stop push-button".

BS APPENDIX

BS 1710:2014
Specification for identification of pipelines and services

BS 3858:1992
Specification for binding and identification sleeves for use on electric cables and wires

BS 4781:1990
Specification for pressure-sensitive adhesive plastics labels for permanent use

BS 4800:2011
Schedule of paint colours for building purposes

BS 4894:1993
Specification for bifurcated rivets for general purpose use (metric series)

BS 4895:1981
Specification for semi-tubular rivets for general purpose use

BS 5472:1977
Specification for low voltage switchgear and controlgear for industrial use. Terminal marking and distinctive number. General rules

BS 5499-10:2014

Guidance for the selection and use of safety signs and fire safety notices

BS 6272:1982
Specification for low voltage switchgear and controlgear for industrial use. Terminal marking. Terminals for external associated electronic circuit components and contacts

BS 6701:2016+A1:2017
Telecommunications equipment and telecommunications cabling. Specification for installation, operation and maintenance

BS 7671:2018
Requirements for electrical installations. IET Wiring Regulations

BS EN 12548:1999
Lead and alloys. Lead alloy ingots for electric cable sheathing and for sleeves

BS EN 12588:2006
Lead and lead alloys. Rolled lead sheet for building purposes

BS EN 50310:2016
Telecommunications bonding networks for buildings and other structures

BS EN 60034-8:2007+A1:2014
Rotating electrical machines. Terminal markings and direction of rotation

BS EN 60073:2002
Basic and safety principles for man-machine interface, marking and identification. Coding principles for indicators and actuators

BS EN 60445:2017
Basic and safety principles for man-machine interface, marking and identification. Identification of equipment terminals, conductor terminations and conductors

BS EN 61439-1:2011
Low-voltage switchgear and controlgear assemblies. Part 1 General rules

BS EN 61439-2:2011
Low-voltage switchgear and controlgear assemblies. Power switchgear and controlgear assemblies

BS EN 61439-3:2012
Low-voltage switchgear and controlgear assemblies. Distribution boards intended to be operated by ordinary persons (DBO)

BS EN 61439-4:2013
Low-voltage switchgear and controlgear assemblies. Particular requirements for assemblies for construction sites (ACS)

BS EN 61439-5:2015
Low-voltage switchgear and controlgear assemblies. Assemblies for power distribution in public networks

BS EN 61439-6:2012
Low-voltage switchgear and controlgear assemblies. Busbar trunking systems (busways)

BS EN 80416-1:2009
Basic principles for graphical symbols for use on equipment. Part 1 Creation of symbol originals

BS EN 80416-2:2001
Basic principles for graphical symbols for use on equipment. Part 2 Form and use of arrows

BS EN 80416-3:2002+A1:2011
Basic principles for graphical symbols for use on equipment. Part 3 Guidelines for the application of graphical symbols

BS EN ISO 7010:2012+A7:2017
Graphical symbols. Safety colours and safety signs. Registered safety signs

BS ISO 3864-1:2011
Graphical symbols. Safety colours and safety signs. Design principles for safety signs and safety markings

BS ISO 3864-1:2011
Graphical symbols. Safety colours and safety signs. Design principles for safety signs and safety markings

BS ISO 3864-3:2012
Graphical symbols. Safety colours and safety signs. Design principles for graphical symbols for use in safety signs

BS ISO 3864-4:2011
Graphical symbols. Safety colours and safety signs. Colorimetric and photometric properties of safety sign materials

BS ISO 17398:2004
Safety colours and safety signs. Classification, performance and durability of safety signs

Y9 Other Common Mechanical and/or Electrical Items

Y90 FIXING TO BUILDING FABRIC

1010 PREPARATION:
- Mark-out, set-out and firmly fix all equipment, components and necessary brackets and supports.

1020 MANUFACTURER'S DRAWINGS:
- Use manufacturer's drawings and templates for purposes of marking and setting out.

1030 FIXINGS:
- Ensure structure and fixings are suitable for items to be fixed.

1040 LOADING DETAILS:
- Provide loading details for all fixing types.

1050 BUILDING-IN BY OTHERS:
- Provide all necessary assistance to enable any item of building-in type to be built in by others.

1060 SIZE OF FIXING:
- Use largest size of bolt, screw or other fixing permitted by diameter of hole in item to be fixed.

1070 GREASING OF FIXINGS:
- Ensure all bolts, screws or other fixings used are greased or lubricated in accordance with manufacturer's instructions.

2000 PRODUCTS/MATERIALS

2010 STANDARDS:
- Ensure that fixings such as expanding anchors are tested for tensile loading in accordance with BS 5080-1.

2020 PLUGS:
- Use plugs of suitable size and length for fixings. Use plastic, fibrous or soft metal non-deteriorating plugs to suit application. Do not use wood plugs.
- Ensure that when screw is in place, threaded length is in plug. Ensure plugs used for screw fixing are set-in to correct depth prior to final tightening.

2030 SCREWS:
- Use screws to BS 1210. Generally use sheradised steel wood screws for fixing to concrete, brickwork or blockwork.
- In damp or exposed situations use greased brass wood screws.

2080 NON-PENETRATIVE SUPPORT SYSTEMS FOR ROOF MOUNTED EQUIPMENT:
- Obtain approval prior to using non-penetrative support systems for roof mounted equipment.

3000 WORKMANSHIP

3010 DRILLING:
- Drill holes squarely. Use drills of requisite size and depth, and appropriate to fabric. Do not flame-cut holes in metal work.

3050 FIXING TO TIMBER RAILS:
- Fix equipment, brackets and supports by drilling hole through timber rail and fixing with bolt, back plate, washer and loose nut.

3060A FIXING TO HOLLOW STUD/TILE/BLOCK WALLS:
- Fix equipment, brackets and supports where there is access at rear of wall, by drilling hole through wall and fixing with bolt, back-plate, washer and loose nut.
- Fix equipment, brackets and supports where there is no access at rear of wall, drill hole and use screw anchor type fixing or gravity type toggle fixing.

-

3070A FIXING TO CONCRETE, BRICKWORK OR BLOCKWORK:
- Fix equipment, brackets and supports using wood screws in plugs or, as appropriate, drill holes and fix using steel bolts of grouted bolt type or expanding bolt type fixing.

3080A FIXING TO METALWORK:
- Fix equipment, brackets and supports by drilling holes and fixing using set screws or bolts complete with washers, shakeproof washers and loose nuts.

3090A FIXING TO STRUCTURAL STEELWORK AND CONCRETE STRUCTURES:
- Provide manufacturer's information on recommended fixing. Obtain approval for any fixing to structure steel work and concrete structures.
- Generally use proprietary fixings to structural steelwork and concrete structures.
- Obtain approval to cut holes in structural steelwork or concrete structures or weld to structural steelwork.

BS APPENDIX

BS 1210:1963
Specification for wood screws.
Current, Work In Hand, Obsolescent

BS 5080-1:1993
Structural fixings in concrete and masonry. Part 1 Method of test for tensile loading

Y91 PAINTING AND ANTI-CORROSION TREATMENTS

1010 GENERAL REQUIREMENTS:
- Ensure, where particular methods of finish and painting are not specified, the following requirements are met.
- Protect all metal work, plant, equipment, pipelines, ductlines, ancillaries, brackets and supports against corrosion and oxidization.
- Provide ferrous metals, machined or otherwise with protective coatings at manufacturer's works.
- Ensure all items requiring on-site decorative finishes are provided primed to suit base material and required finish.

1020 DAMAGED FINISHES:
- Following delivery to site, storage on-site and installation make good any damage to finishes, by cleaning, degreasing and re-furbishing.

2000 PRODUCTS/MATERIALS

2010# PAINT MATERIALS:
- Use the following materials as appropriate
  - Solvent borne priming paint to BS 7956.
  - Red Oxide priming paint.
  - Zinc Chromate priming paint.
  - Calcium Plumbate priming paint to BS 3698.
  - Undercoat paint.
  - Gloss finishing paint.
  - Water borne emulsion paints to BS 7719.
  - Epoxy resin paint.
  - Aluminium paint to BS 388.
  - Cold galvanizing paint.
  - Zinc-rich metallic to BS 4652.
  - Black tar-based paint to BS 1070.
  - Bitumen based coatings for cold application to BS 3416.
  - Paints for aluminium alloys to BS 4842, BS 6496.
  - Paints for galvanized steel to BS EN 13438.
  - Bitumen based coatings for cold applications to BS 6949.
  - Undercoats and finishing paints to BS 7664.

2010A PAINT MATERIALS:
- Use the following materials as appropriate
  - Solvent borne priming paint to BS 7956 for bare woodwork.
  - Red Oxide priming paint for bare iron and steelwork.
  - Zinc Chromate priming paint for bare ferrous and non-ferrous metals.
  - Calcium Plumbate priming paint to BS 3698 for galvanized steel or composite wood/metal components.
  - Undercoat paint for previously primed or painted surfaces before the application of finishing coats.
  - Gloss finishing paint for previously primed or painted/undercoated surfaces.
  - Epoxy resin paint for specialist coatings requiring resistance to acids, alkalis, oils, solvents, abrasion or high humidity.
  - Aluminium paint to BS 388 for structural steelwork, storage vessels, heated metallic surfaces and similar applications where moisture and heat resistant properties are required.
  - Cold galvanizing paint for making good damage to previously galvanized surfaces and protection to galvanized materials modified during installation.
  - Zinc-rich metallic to BS 4652 for bare iron and steelwork where electrical conductivity has to be assured.
  - Black tar-based paint to BS 1070 for moisture resistant protection to metal surfaces where decorating

appearance is not important.
- Bitumen based coatings for cold application to BS 3416 protection to iron and steel, particularly pipelines and fittings for use in contact with potable water.
- Bitumen based coatings for cold application to BS 6949 not to be used in contact with potable water.

2020 PAINT QUALITY:
- Ensure paints used are of quality and type to suit application and that:-
  - primers have good adhesion, covering power, rust-inhibiting and grain filling properties.
  - gloss finishing paints are of machine finish grade having high adhesion and high resistance to solvents, mineral oils, cutting oils, detergents, chipping and impact damage.

3000 WORKMANSHIP

3020 WEATHER AND OTHER CONDITIONS:
- Do not apply paints where weather, temperature, humidity or other conditions may have a damaging effect upon finish or paint.

3030A CLEANING AND PREPARING STEEL SURFACES FOR PAINTING:
- Ensure metal surfaces are thoroughly cleaned, all mill and weld scale removed and finally degreased. Clean steel surfaces in accordance with BS EN ISO 8503 and prepare surfaces for painting in accordance with BS EN ISO 4618.

3030B CLEANING AND PREPARING SURFACES FOR PAINTING:
- Ensure metal surfaces are thoroughly cleaned, all mill and weld scale removed and finally degreased.
- Prepare surfaces for painting in accordance with BS EN ISO 4618.

3040 APPLICATION OFF-SITE:
- Wherever possible ensure paint finishes applied by component manufacturers are spray applied.

3050 APPLICATION:
- Apply paint evenly and ensure finish shows no excessive brush marks, grinning, runs, sagging, ropiness or other application defects.

3060 COLD GALVANIZING:
- Repair damage to galvanized components due to installation process, i.e. following cutting, drilling or welding, by applying 2 no. substantial coats of cold galvanizing paint.

3070 PROTECTION OF BRIGHT MACHINE PARTS:
- Apply a protective coating to all bright machined parts before despatch from works.
- Do not remove protective coatings unless required for installation, testing or commissioning purposes and in such cases reinstate upon completion.
- Repair any damaged protective coating or bright machined part, or where necessary replace damaged component.
- Use and apply metal coatings in accordance with manufacturer's instructions.
- Complete where possible all welding, drilling, bending and other work before metal coating.

BS APPENDIX

BS 388:1972
Specification for aluminium pigments

BS 1070:1993
Specification for black paint (tar-based)

BS 3416:1991
Specification for bitumen-based coatings for cold application, suitable for use in contact with potable water

BS 3698:1964
Specification for calcium plumbate priming paints

BS 4652:1995
Specification for zinc-rich priming paint (organic media)

BS 4842:1984
Specification for liquid organic coatings for application to aluminium alloy extrusions, sheet and preformed sections for external architectural purposes, and for the finish on aluminium alloy extrusions, sheet and preformed sections coated with liquid organic coatings

BS 6496:1984
Specification for powder organic coatings for application and stoving to aluminium alloy extrusions, sheet and preformed sections for external architectural purposes, and for the finish on aluminium alloy extrusions, sheet and preformed sections coated with powder organic coatings

BS 6949:1991
Specification for bitumen-based coatings for cold application excluding use in contact with potable water

BS 7664:2000
Specification for undercoat and finishing paints

BS 7719:1994
Specification for water-borne emulsion paints for interior use

BS 7956:2000
Specification for primers for woodwork

BS EN 13438:2005
Paints and varnishes. Powder organic coatings for galvanized or sherardised steel products for construction purposes

BS EN ISO 4618-3:2014
Paints and varnishes. Terms and definitions for coating materials. Part 3 Surface preparation and methods of application

BS EN ISO 4618:2014
Paints and varnishes. Terms and definitions

BS EN ISO 8503-5:2004
Preparation of steel substrates before application of paints and related products. Surface roughness characteristics of blast-cleaned steel substrates. Part 5 Replica tape method for the determination of the surface profile

Y92 MOTOR DRIVES - ELECTRIC

1010 STANDARDS:

- Supply and install motors in accordance with BS EN 50347, for dimensional requirements of general purpose 3-phase induction motors, relevant parts of BS EN 60034, BS EN 62262 and BS 4999 as appropriate; and local supply authority regulations.
- Electrical equipment intended for use in potentially hazardous areas / explosive atmospheres to comply with relevant parts of BS EN IEC 60079/BS EN 60079 and be tested, certified and marked that the equipment is fit for its intended purpose and that adequate information is supplied with it to ensure that it can be used safely.

1040A MANUFACTURER FITTED SURGE SUPPRESSORS:

- Supply built-in surge suppressors to star connected motors and to all motors subject to star-delta starting to limit peak voltage to 1200 volts. Fitted by manufacturer.

1040B INSTALLER FITTED SURGE SUPPRESSORS:

- Supply external surge suppressors to star connected motors and to all motors subject to star-delta starting to limit peak voltage to 1200 volts. Fitted by installer.

1050A MANUFACTURER FITTED TRANSIENT SURGE SUPPRESSORS:

- Supply built-in transient surge suppressors across the starter contactor coils. Fitted by manufacturer.

1050B INSTALLER FITTED TRANSIENT SURGE SUPPRESSORS:

- Supply external transient surge suppressors across the starter contactor coils. Fitted by installer.

2000 PRODUCTS/MATERIALS:

2010A STANDARD OPERATING CONDITIONS:

- Ensure motors, starters and ancillary equipment are suitable for operation at full capacity at heights above sea level not exceeding 1000m, with air cooling at an average temperature over 24 hours not exceeding 35°C dry bulb with maximum conditions of 40°C dry bulb and 50 per cent RH.

2010B NON STANDARD OPERATING CONDITIONS:

- Ensure motors, starters and ancillary equipment are suitable for operation at full capacity at heights above sea level above 1000m, with conditions exceeding 40°C dry bulb and 50 per cent RH.

2020 MOTORS - GENERAL:

- Standard
  - Use motors which conform to BS EN 60034, as applicable, which operate at lowest possible speed, compatible with performance requirements.
  - Terminal markings and direction of rotation to be in accordance with BS EN 60034-8
  - Provide isolation during repair and maintenance work in accordance with BS EN 62626-1
- Comply with EC Regulation 640/2009 and amendment EU Regulation 4/2014 with regard to ecodesign requirements for electric motors.
- Ratings
  - Select maximum continuous rating (MCR) such that driven machine operates at correct speed or speeds at design duty.
- When running continuously at design rated duty, the temperature of the motor parts is within limits defined in BS EN 60034-1
- When provided with excess motor current (over-load) protection of thermal overcurrent release type, ensure operation is within tolerances of tripping as defined in BS EN 60947-4-1.

Insulation

- Use motors with Class 130 or 155 to BS EN 60085 insulation, with temperature rise as defined in BS EN 60085
- Conduit entry
  - Fit motor bodies with conduit entry terminal box or cable gland as required, and to suit type and size of cable being terminated.
- Comply with BS EN 60034-5 and BS EN 62262 to achieve the specified degrees of protection classification provided by the integral design.

2025A MOTOR EFFICIENCY:

- Supply an IE2 motor with a minimum efficiency compliant with BS EN 60034-30-1 as shown in the table below:

IE2 Motor Efficiency Limits (%) for 50 Hz: figures taken from BS EN 60034-30-1 Table 5				
Rated Power (kW)	No. of Poles/Synchronous Speed (RPM)			
	2/3000	4/1500	6/1000	8/750
0.12	53.6	59.1	50.6	39.8
0.18	60.4	64.7	56.6	45.9
0.20	61.9	65.9	58.2	47.4
0.25	64.8	68.5	61.6	50.6
0.37	69.5	72.7	67.6	56.1
0.40	70.4	73.5	68.8	57.2
0.55	74.1	77.1	73.1	61.7
0.75	77.4	79.6	75.9	66.2
1.1	79.6	81.4	78.1	70.8
1.5	81.3	82.8	79.8	74.1
2.2	83.2	84.3	81.8	77.6
3	84.6	85.5	83.3	80.0
4	85.8	86.6	84.6	81.9
5.5	87.0	87.7	86.0	83.8
7.5	88.1	88.7	87.2	85.3
11	89.4	89.8	88.7	86.9
15	90.3	90.6	89.7	88.0
18.5	90.9	91.2	90.4	88.6
22	91.3	91.6	90.9	89.1
30	92.0	92.3	91.7	89.8
37	92.5	92.7	92.2	90.3
45	92.9	93.1	92.7	90.7
55	93.2	93.5	93.1	91.0
75	93.8	94.0	93.7	91.6
90	94.1	94.2	94.0	91.9
110	94.3	94.5	94.3	92.3
132	94.6	94.7	94.6	92.6
160	94.8	94.9	94.8	93.0
200	95.0	95.1	95.0	93.5

2025B MOTOR EFFICIENCY:

- Supply a IE3 motor with a minimum efficiency compliant with BS EN 60034-30-1 as shown in the table below:

IE3 Motor Efficiency Limits (%) for 50 Hz: figures taken from BS EN 60034-30-1 Table 7	
Rated Power (kW)	No. of Poles/Synchronous Speed (RPM)

	2/3000	4/1500	6/1000	8/750
0.12	60.8	64.8	57.7	50.7
0.18	65.9	69.9	63.9	58.7
0.20	67.2	71.1	65.4	60.6
0.25	69.7	73.5	68.6	64.1
0.37	73.8	77.3	73.5	69.3
0.40	74.6	78.0	74.4	70.1
0.55	77.8	80.8	77.2	73.0
0.75	80.7	82.5	78.9	75.0
1.1	82.7	84.1	81.0	77.7
1.5	84.2	85.3	82.5	79.7
2.2	85.9	86.7	84.3	81.9
3	87.1	87.7	85.6	83.5
4	88.1	88.6	86.8	84.8
5.5	89.2	89.6	88.0	86.2
7.5	90.1	90.4	89.1	87.3
11	91.2	91.4	90.3	88.6
15	91.9	92.1	91.2	89.6
18.5	92.4	92.6	91.7	90.1
22	92.7	93.0	92.2	90.6
30	93.3	93.6	92.9	91.3
37	93.7	93.9	93.3	91.8
45	94.0	94.2	93.7	92.2
55	94.3	94.6	94.1	92.5
75	94.7	95.0	94.6	93.1
90	95.0	95.2	94.9	93.4
110	95.2	95.4	95.1	93.7
132	95.4	95.6	95.4	94.0
160	95.6	95.8	95.6	94.3
200	95.8	96.0	95.8	94.6

2025C MOTOR EFFICIENCY:

- Supply an IE4 motor with a minimum efficiency compliant with BS EN 60034-30-1 as shown in the table below:

IE4 Motor Efficiency Limits (%) for 50 Hz: figures taken from BS EN 60034-30-1 Table 9				
Rated Power (kW)	No. of Poles/Synchronous Speed (RPM)			
	2/3000	4/1500	6/1000	8/750
0.12	66.5	69.8	64.9	62.3
0.18	70.8	74.7	70.1	67.2
0.20	71.9	75.8	71.4	68.4
0.25	74.3	77.9	74.1	70.8
0.37	78.1	81.1	78.0	74.3
0.40	78.9	81.7	78.7	74.9
0.55	81.5	83.9	80.9	77.0
0.75	83.5	85.7	82.7	78.4
1.1	85.2	87.2	84.5	80.8
1.5	86.5	88.2	85.9	82.6
2.2	88.0	89.5	87.4	84.5
3	89.1	90.4	88.6	85.9
4	90.0	91.1	89.5	87.1
5.5	90.9	91.9	90.5	88.3
7.5	91.7	92.6	91.3	89.3
11	92.6	93.3	92.3	90.4

15	93.3	93.9	92.9	91.2
18.5	93.7	94.2	93.4	91.7
22	94.0	94.5	93.7	92.1
30	94.5	94.9	94.2	92.7
37	94.8	95.2	94.5	93.1
45	95.0	95.4	94.8	93.4
55	95.3	95.7	95.1	93.7
75	95.6	96.0	95.4	94.2
90	95.8	96.1	95.6	94.4
110	96.0	96.3	95.8	94.7
132	96.2	96.4	96.0	94.9
160	96.3	96.6	96.2	95.1
200	96.5	96.7	96.3	95.4

2030 SLIDE RAILS:

- Fit motors on slide rails or other suitable means of adjustment to facilitate correct alignment and belt tension.

2040 PLINTHS:

- Where plinths are built in by others, provide all necessary assistance and information.

2060A MOTORS - OVER TEMPERATURE PROTECTION, THERMISTORS:

- Fit positive temperature coefficient thermistors to BS EN 60034-11. Provide a minimum of 3 PTC thermistors in each motor with 2 ends terminated in motor terminal box clearly and permanently marked.
  - For motors rated between 30kW and 75kW provide a single thermistor in each phase.
  - For motors rated above 75kW provide two thermistors in each phase.
- Provide control unit to BS EN 60034 to motors fitted with thermistors. Interconnect control unit with thermistors and starter to trip starter when one or all of thermistors detect overheating.

2070A INDIRECT DRIVES WITH TOOTHED BELTS:

- Belts
  - Use toothed wedge belts to BS 3790. Provide at least two matched belts for any drive, of anti-static type and rated to transmit full machine power with one belt removed.
- Pulleys
  - Construct pulleys from approved materials and statically balance. Lock close limit bores by keys fitting into machinery shaft keyway.
- Pulley adjustment
  - Adjust pulley to give alignment and correct belt tension.

2070B INDIRECT DRIVES WITH FLAT BELTS:

- Belts
  - Use flat wedge belts to BS 3790. Provide at least two matched belts for any drive, of anti-static type and rated to transmit full machine power with one belt removed.
- Pulleys
  - Construct pulleys from approved materials and statically balance. Lock close limit bores by keys fitting into machinery shaft keyway.
- Pulley adjustment
  - Adjust pulley to give alignment and correct belt tension.

2080A DIRECT LONG COUPLED DRIVES:

- Use an extended motor shaft coupled to machine or a flexible coupling connecting driving and driven shafts, incorporate suitable arrangements for aligning the two shafts.
- Mount motors on a substantial mild steel bed plate fixed to machine casing separately supported or

supported entirely from the machine casing.

2090A GUARDS:

- Totally protect drives and couplings. Fit purpose made guards around all exposed or otherwise accessible drive shafts, pulleys, V-belts or couplings.
- Ensure guards comply with national or local safety codes, Acts and Bylaws and incorporate following features
  - Construction to BS EN ISO 12100 and generally of galvanized steel wire mesh
  - Stiffening within the guards to ensure rigidity and freedom from vibration
  - Allowance for prime mover adjustment during belt tensioning procedures
  - Temporary access to all shafts for use of Tachometer

BS APPENDIX

BS 3790:2006
Specification for belt drives. Endless wedge belts, endless V-belts, banded wedge belts, banded V-belts and their corresponding pulleys

BS 4999-103:2004
General requirements for rotating electrical machines. Part 103 Specification for symbols

BS 4999-140:1987
General requirements for rotating electrical machines. Part 140 Specification for voltage regulation and parallel operation of a.c. synchronous generators

BS 4999-141:2004+A1:2010
General requirements for rotating electrical machines. Part 141 Specification for standard dimensions

BS 4999-145:1987
General requirements for rotating electrical machines. Part 145 Specification for winding terminations

BS 4999-147:1988
General requirements for rotating electrical machines. Part 147 Specification for dimensions of brushes and brush-holders for electrical machinery

BS EN 50347:2001
General purpose three-phase induction motors having standard dimensions and outputs. Frame numbers 56 to 315 and flange numbers 65 to 740

BS EN 60034-1:2010
Rotating electrical machines. Rating and performance

BS EN 60034-2-1:2014
Rotating electrical machines. Part 2-1 Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles)

BS EN 60034-2-2:2010
Rotating electrical machines. Specific methods for determining separate losses of large machines from tests. Supplement to IEC 60034-2-1

BS EN 60034-3:2008
Rotating electrical machines. Part 3 Specific requirements for synchronous generators driven by steam turbines or combustion gas turbines

BS EN 60034-4:2008
Rotating electrical machines. Part 4 Methods for determining synchronous machine quantities from tests

BS EN 60034-5:2001
Rotating electrical machines. Part 5 Degrees of protection provided by the integral design of rotating electrical machines (IP code). Classification

BS EN 60034-6:1994, IEC 60034-6:1991
Rotating electrical machines. Part 6 Methods of cooling (IC Code)

BS EN 60034-7:1993, IEC 60034-7:1992
Rotating electrical machines. Part 7 Classification of types of constructions and mounting arrangements (IM Code)

BS EN 60034-8:2007+A1:2014
Rotating electrical machines. Terminal markings and direction of rotation

BS EN 60034-9:2005
Rotating electrical machines. Part 9 Noise limits

BS EN 60034-11:2004
Rotating electrical machines. Part 11 Thermal protection

BS EN 60034-11:2004
Rotating electrical machines. Part 11 Thermal protection

BS EN 60034-12:2017
Rotating electrical machines. Starting performance of single-speed three-phase cage induction motors

BS EN 60034-14:2004
Rotating electrical machines. Part 14 Mechanical vibration of certain machines with shaft heights 56 mm and higher. Measurement, evaluation and limits of vibration severity

BS EN 60034-15:2009
Rotating electrical machines. Part 15 Impulse voltage withstand levels of form-wound stator coils for rotating a.c. machines

BS EN 60034-16-1:2011
Rotating electrical machines. Excitation systems for synchronous machines. Definitions

BS EN 60034-18-1:2010
Rotating electrical machines. Part 18-1 Functional evaluation of insulation systems. General guidelines

BS EN 60034-18-21:2013
Rotating electrical machines. Part 18-21 Functional evaluation of insulation systems. Test procedures for wire-wound windings. Thermal evaluation and classification.

BS EN 60034-18-22:2001, IEC 60034-18-22:2000
Rotating electrical machines. Part 18-22 Functional evaluation of insulation systems. Test procedures for wire-wound windings. Classification of changes and insulation component substitutions

BS EN 60034-18-31:2012
Rotating electrical machines. Part 18-31 Functional evaluation of insulation systems. Test procedures for form-wound windings. Thermal evaluation and classification of insulation systems used in rotating machines

BS EN 60034-18-32:2010
Rotating electrical machines. Part 18-32 functional evaluation of insulation systems. Test procedures for form-wound windings. Evaluation by electrical endurance

BS EN 60034-18-34:2012
Rotating electrical machines. Part 18-34 functional evaluation of insulation systems. Test procedures for form-wound windings. Evaluation of thermomechanical endurance of insulation systems

BS EN 60034-18-41:2014
Rotating electrical machines. Partial discharge free electrical insulation systems (Type I) used in rotating electrical machines fed from voltage converters. Qualification and quality control tests

BS EN 60034-19:2014
Rotating electrical machines. Specific test methods for d.c. machines on conventional and rectifier-fed supplies

BS EN 60034-22:2009
Rotating electrical machines. Part 22 AC generators for reciprocating internal combustion (RIC) engine driven generating sets

BS EN 60034-26:2006
Rotating electrical machines. Effects of unbalanced voltages on the performance of three-phase cage induction motors

BS EN 60034-27-3:2016
Rotating electrical machines. Dielectric dissipation factor measurement on stator winding insulation of rotating electrical machines

BS EN 60034-28:2013
Rotating electrical machines. Part 28 test methods for determining quantities of equivalent circuit diagrams for three-phase low-voltage cage induction motors

BS EN 60034-29:2008
Rotating electrical machines. Part 29 Equivalent loading and superposition techniques. Indirect testing to determine temperature rise

BS EN 60034-30-1:2014
Rotating electrical machines. Efficiency classes of line operated AC motors (IE code)

BS EN 60034-30:2009
Rotating electrical machines. Efficiency classes of single-speed, three-phase, cage-induction motors (IE-code)

BS EN 60079-1:2014
Explosive atmospheres. Equipment protection by flameproof enclosures "d"

BS EN 60079-2:2014
Explosive atmosphere. Equipment protection by pressurized enclosure "p"

BS EN 60079-5:2015
Explosive atmospheres. Equipment protection by powder filling "q"

BS EN 60079-6:2015
Explosive atmospheres. Equipment protection by liquid immersion “o”

BS EN 60079-10-1:2015
Explosive atmospheres. Part 10-1 Classification of areas. Explosive gas atmospheres

BS EN 60079-10-2:2015
Explosive atmospheres. Classification of areas. Explosive dust atmospheres

BS EN 60079-11:2012
Explosive atmospheres. Part 11 Equipment protection by intrinsic safety "i"

BS EN 60079-13:2017
Explosive atmospheres. Equipment protection by pressurized room "p"

BS EN 60079-14:2014
Explosive atmospheres. Electrical installations design, selection and erection

BS EN 60079-15:2010
Explosive atmospheres. Part 15 Equipment protection by type of protection "n"

BS EN 60079-17:2014
Explosive atmospheres. Part 17 Electrical installations inspection and maintenance

BS EN 60079-18:2015+A1:2017
Explosive atmospheres. Equipment protection by encapsulation "m"

BS EN 60079-19:2011+A1:2015
Explosive atmospheres. Equipment repair, overhaul and reclamation

BS EN 60079-20-1:2010
Explosive atmospheres. Material characteristics for gas and vapour classification. Test methods and data

BS EN 60079-25:2010
Explosive atmospheres. Part 25 Intrinsically safe electrical systems

BS EN 60079-26:2015
Explosive atmospheres. Equipment with equipment protection level (EPL) Ga

BS EN 60079-27:2008
Explosive atmospheres. Fieldbus intrinsically safe concept (FISCO)

BS EN 60079-28:2015
Explosive atmospheres. Protection of equipment and transmission systems using optical radiation

BS EN 60079-29-1:2016
Explosive atmospheres. Gas detectors. Performance requirements of detectors for flammable gases

BS EN 60079-29-2:2015
Explosive atmospheres. Gas detectors. Selection, installation, use and maintenance of detectors for flammable gases and oxygen

BS EN 60079-29-3:2014
Explosive atmospheres. Gas detectors. Guidance on functional safety of fixed gas detection systems

BS EN 60079-29-4:2010
Explosive atmospheres. Gas detectors. Performance requirements of open path detectors for flammable gases

BS EN 60079-30-1:2017
Explosive atmospheres. Electrical resistance trace heating. General and testing requirements

BS EN 60079-30-2:2017
Explosive atmospheres. Part 30-2 Electric resistance trace heating. Application guide for design, installation and maintenance

BS EN 60079-31:2014
Explosive atmospheres. Equipment dust ignition protection by enclosure "t"

BS EN 60079-32-2:2015
Explosive atmospheres. Electrostatics hazards. Tests

BS EN 60079-35-1:2011
Explosive atmospheres. Caplights for use in mines susceptible to firedamp. General requirements. Construction and testing in relation to the risk of explosion

BS EN 60079-35-2:2012
Explosive atmospheres. Caplights for use in mines susceptible to firedamp. Performance and other safety-related matters

BS EN 60085:2008
Electrical insulation. Thermal evaluation and designation

BS EN 60947-4-1:2010+A1:2012
Low-voltage switchgear and controlgear. Part 4-1 Contactors and motor-starters. Electromechanical contactors and motor-starters

BS EN 62262:2002
Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)

BS EN 62626-1:2014
Low-voltage switchgear and controlgear enclosed equipment. Enclosed switch-disconnectors outside the scope of IEC 60947-3 to provide isolation during repair and maintenance work

BS EN ISO 12100:2010
Safety of machinery. General principles for design. Risk assessment and risk reduction